EVG®520HE Users Manual

Operator Manuals

General Information

Interlock List

Start Up & GUI

De-embossing Station

EVG Explorer

EVG CIMFramework

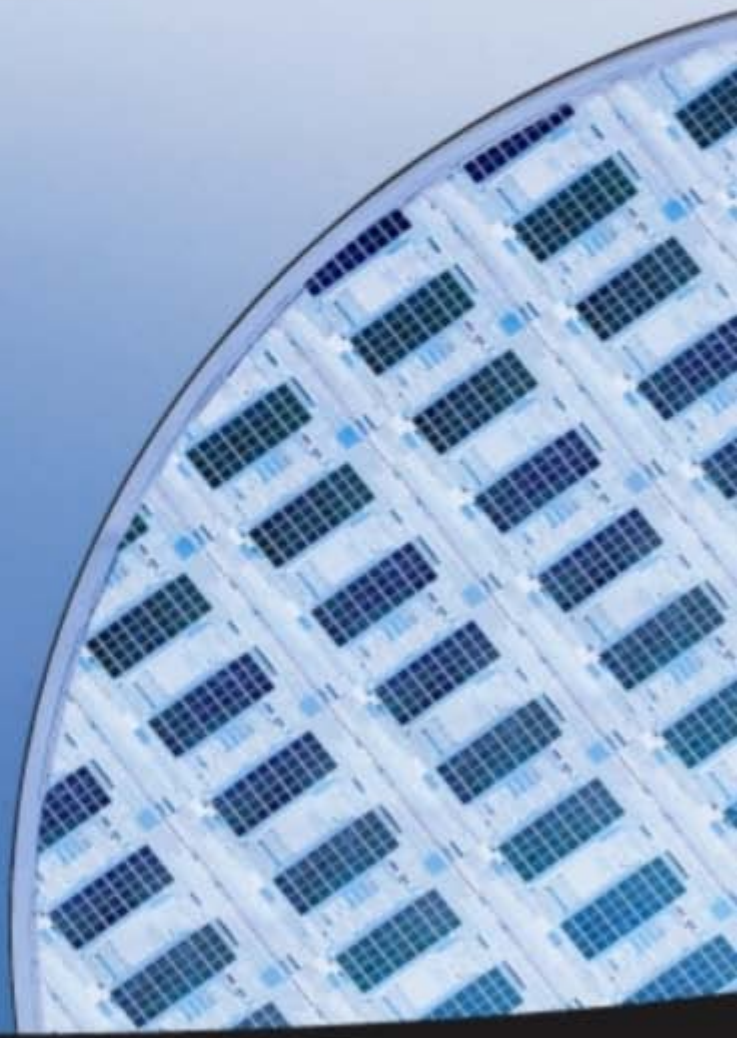
EVG500 - Wafer Bonding Module

Bond Module

Maximum Piston Force

Preventive Maintenance

EaseUS Todo Backup



General Information

Customer Support Documentation
EVG

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1 Note to the User

Installation, adjustment, programming and maintenance (except periodical maintenance described in the manual) may only be done by qualified EVG service engineers.

For further deliveries please check immediately after unpacking that the consignment confirms to the information given on the packing list.

Read and understand the operating and safety instructions before you operate the unit and follow them in all respects.

The equipment may only be operated by personal trained from EVG service engineers.

No liability will be accepted for personal injury or material damage in the event that damage or breakdowns occur as a result of failure to comply with these operating instructions; neither will any guarantees relating to repairs to or replacements of our products apply.

End-of-Life Recycling

The equipment is designed for an easy end-of-life recycling. Please contact EV Group under recycling@evgroup.com to obtain further information regarding proper recycling.

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2 About this Manual

The following manual is written for documentation purposes. It describes the system and its modules, the GUI of the software (EVG Explorer and EVG Framework) and steps that have to be performed for preventive maintenance.

It is written for operator and engineer level (see table below).

General Information	basic information about the system and its documentation
Safety Interlock List	location and descriptions of safety interlocks
Start Up Manual	system description and start up information
EVG Explorer	GUI which provides quick access to applications depending on the login level
Framework – Basic	general information about the software for operator level (e.g. starting a process)
Framework – Advanced	general information about the software for engineer level (e.g. recipe programming)
Module(s) – Basic	module-specific information for operator level
Module(s) – Advanced	module-specific information for engineer level
Preventive Maintenance	steps recommended for preventive maintenance
EaseUS Todo Backup	backup and restore the system using the installed software

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3 Recovery from Errors

Most errors that will occur require going into an engineering or maintenance level screen to execute certain functions to recover the tools and the system.

Things that the operator can do in case of an error:

1) Press the Emergency Stop button only if injury of personnel or serious damages of the system impends immediately.
2) Call a trained maintenance person to perform what is needed to recover.

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History

Date	Modification	by
2011-11-17	First written	WAA

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State:	Released		Author:	WAA
File:	EVG_GeneralInformation_GN_eng_01.doc			
Created on:	2010-03-18		Printed on:	2012-01-16
Version:	1.0		Last revision	2011-11-17
Purpose:	Operation		Language:	EN

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Interlock List

Customer Support Documentation
EVG520IS / EVG520HE

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1 Interlock List

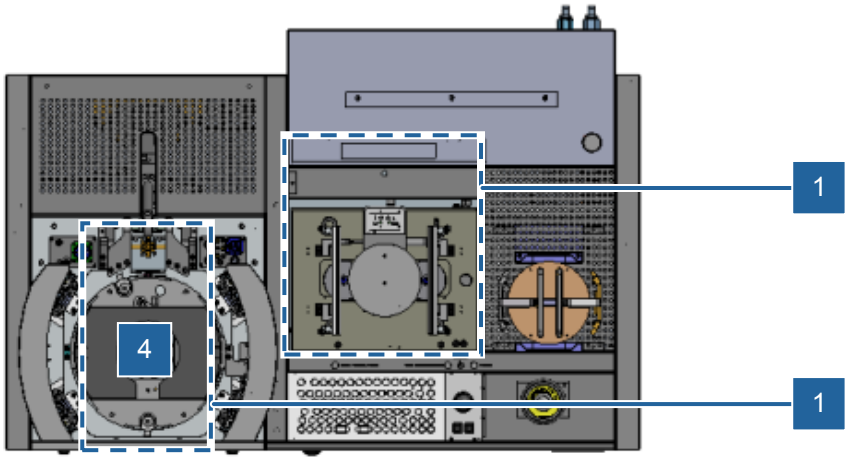

Figure 1 - Top View

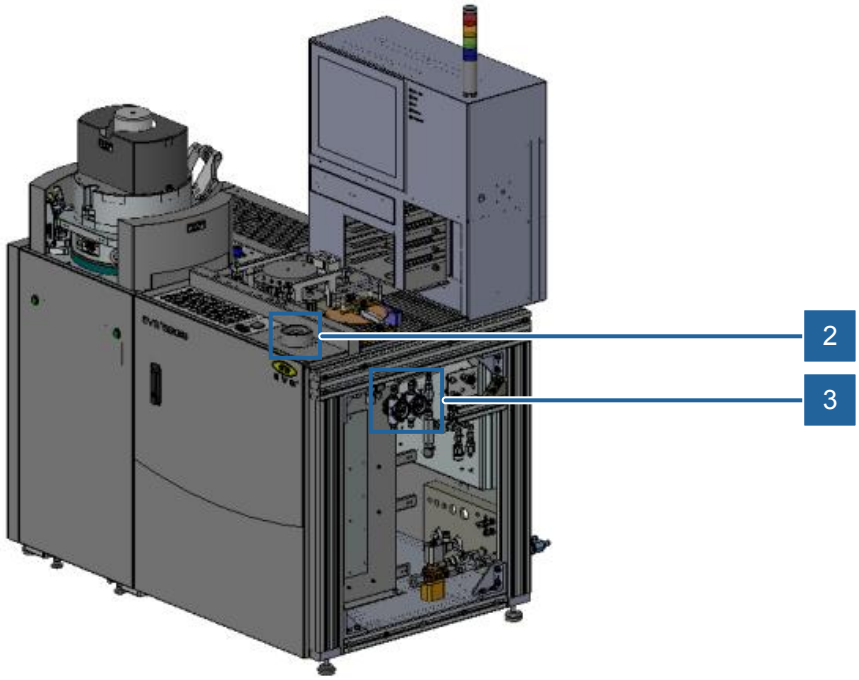

Figure 2 - Isometric View

1	Leakage Sensor
2	EMO Button
3	Water Flow Sensor
4	Over Temperature Sensors

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1.1 Leak Sensor

Below the cooling station and the bond chamber there is a tray with a liquid sensor. If liquid reaches the sensor the system shuts down.

Sensor:

Liquid level switch SK1-8-M12-P-nb-Ö

Figure 3 - Leak Sensor

Function:

If liquid reaches the sensor only the water supply stops.

Recovery Procedure:

1) It is necessary to fix the leak.
2) Restart the whole system.
3) Perform an automatic clean up (if available).
4) Start a new process.

Location:

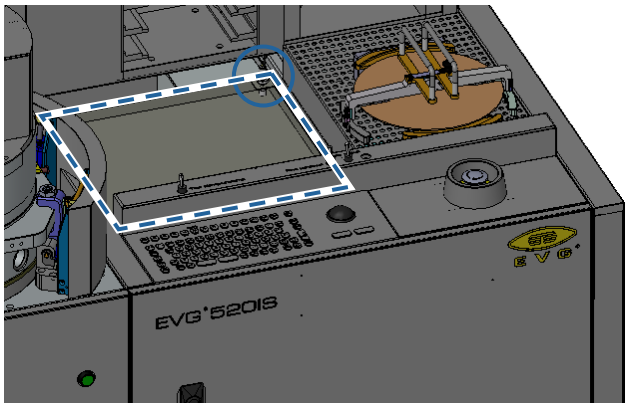

Figure 4 - Leak Sensor

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1.2 Water Flow Sensor

The water flow sensor checks the general water flow.

Sensor:

Flow meter RFO-165071

Figure 5

Function:

If the water flow is to low the top and bottom heaters shut down after 120 sec.

Recovery Procedure:

1) Check the water flow.
2) Start a new process.

Location:

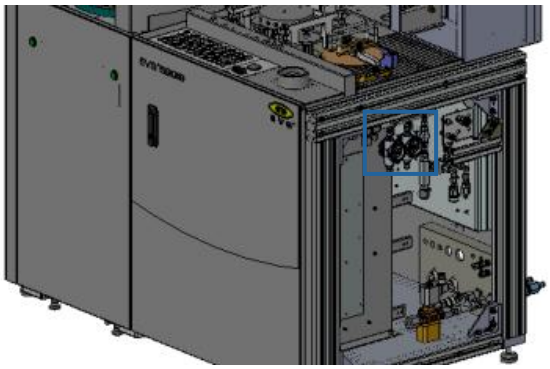

Figure 6 - Water Flow Sensor

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1.3 Over Temperature Sensor

The over temperature sensor checks the temperature of the heaters.

1.3.1 Over Temperature Sensor in the Electronic Rack (3a)

Sensor:

Temp.limiter TB45 TB/TW-2INP with BC

Function:

If the temperature is higher than 650°C the chamber will be disabled.

Recovery Procedure:

1) Reset the temperature limiter TB45.
2) Enable the chamber.
3) Check the heating and start a new process.

This failure occurs only when there is a problem with the hardware. In this case call EV Group!

1.3.2 Over Temperature Sensor at the Bond Cover (3b)

Sensor:

Temperature switch R2811EN 65°C nc (marked with “a” in picture below)

Function:

If the temperature is higher than 63°C the station will be disabled.

Recovery Procedure

Permit a cool down and check the cover cooling (cooling chuck marked with “b” in picture above). Enable the station and start a new process.

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Location:

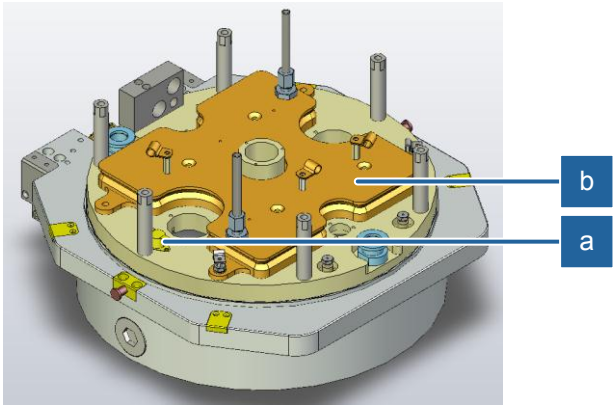

Figure 7 –Bond cover

There is another over-temperature sensor (“Temperature switch B12E 100°C”; marked with “c” in the picture below) on the bottom side of the bond cover.

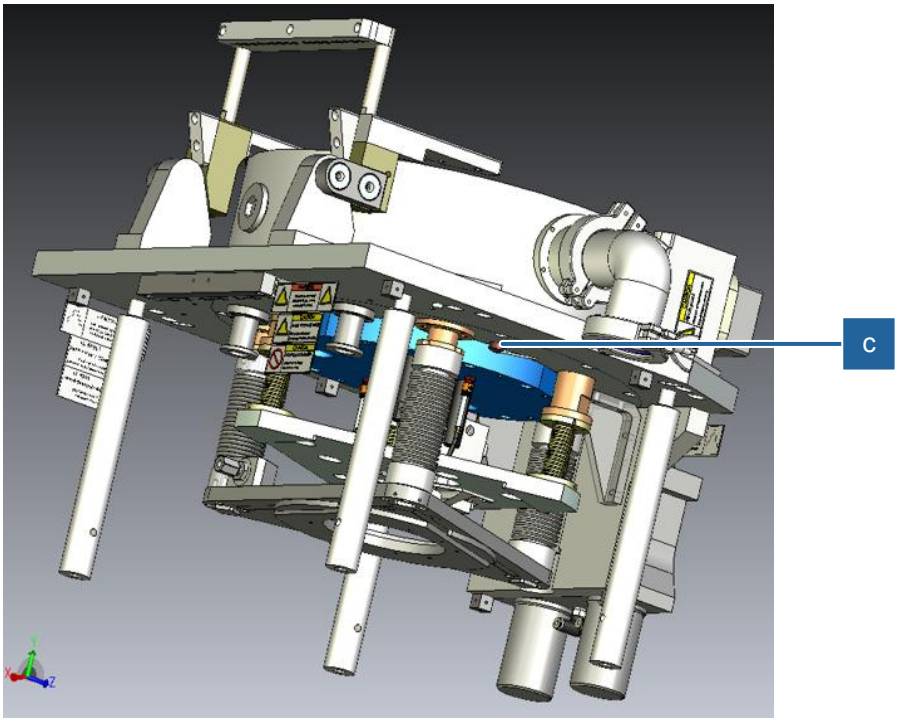

Figure 8 - Bottom side of the bond cover

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1.4 EMO Button

The Emergency OFF Button (EMO Button) shuts down the system immediately.

Switch:

Emergency off switch ABB CE4T-10R-02

Figure 9 - EMO Button

Function:

In an emergency situation press the nearest EMO Button on the system. Emergency situations are situations where injury of personnel or serious damages of the system impends immediately.

Recovery Procedure:

In order to operate the system again it has to be restarted:

1) Release the EMO button (turn clockwise).
2) Start up the system.
3) Perform an automatic clean up (if available).
4) Start a new process.

Location:

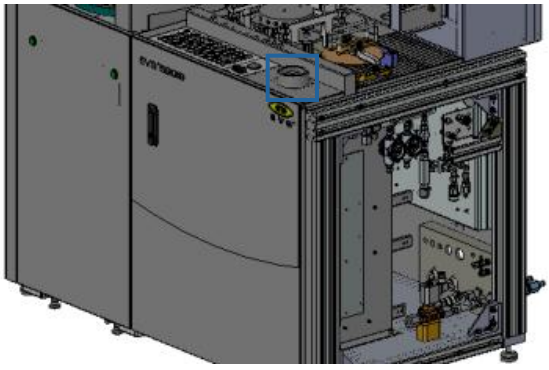

Figure 10 - EMO Button

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2 Circuit Diagrams

The following figure shows an example electronic drawing of an interlock connection:

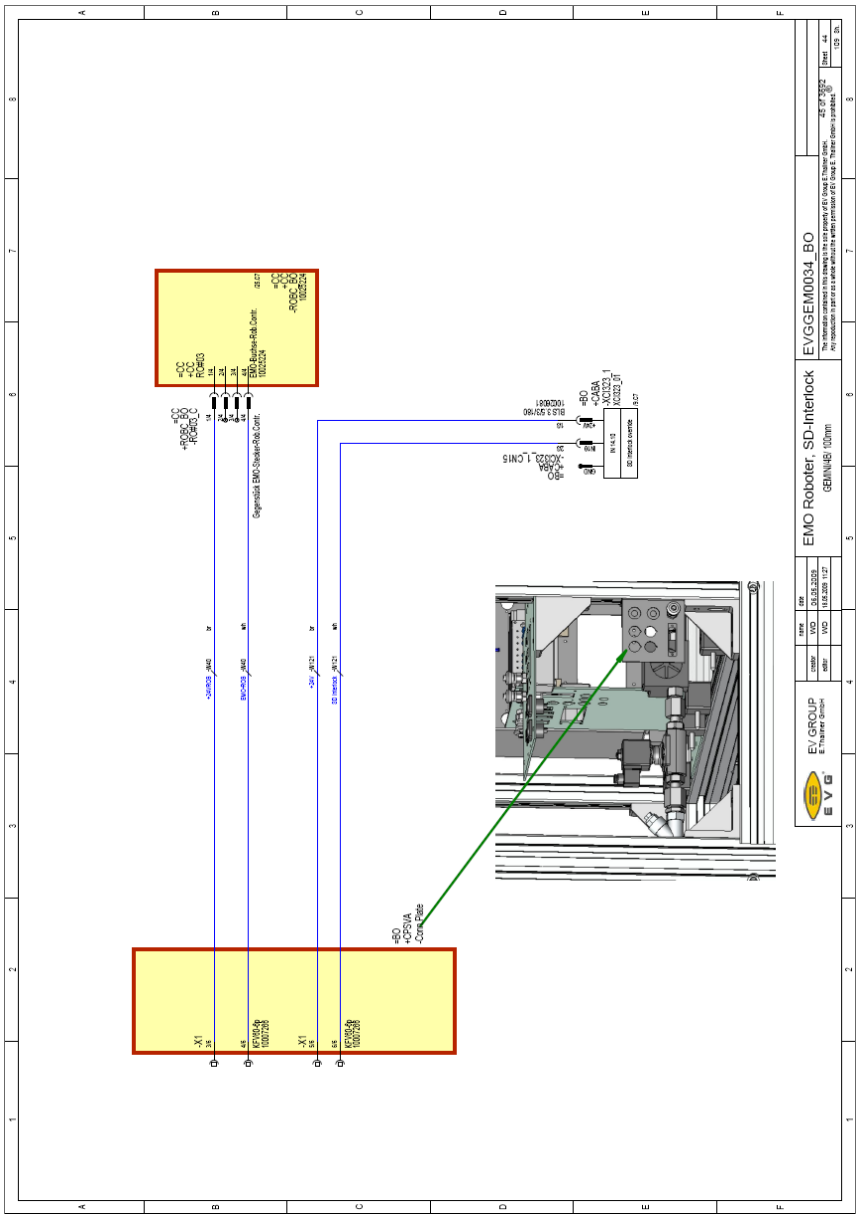

Figure 11 - Electronic Drawing (EMO Robot, Safety Door Interlock)

Note: This is an example circuit diagram. Refer to “Technical Documentation” / “Electronic Drawings” to find all circuit diagrams of the system.

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History

Date	Modification	by
2007-10-02	First written with GCA	HMA
2010-04-06	Formatted and updated	WAA
2013-03-18	Formatted and updated	HBA
2013-10-09	Formatted and updated	HBA

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State:	Released		Author:	WAA
File:	EVG520IS+EVG520HE_InterlockList_OO_eng_04.doc			
Created on:	2013-10-09		Printed on:	2013-10-10
Version:	2.0		Last revision	2010-04-06
Purpose:	Operation		Language:	EN

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Start Up and GUI

Customer Support Documentation
EVG520 & EVG520IS

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1 System Description

1.1 System Layout

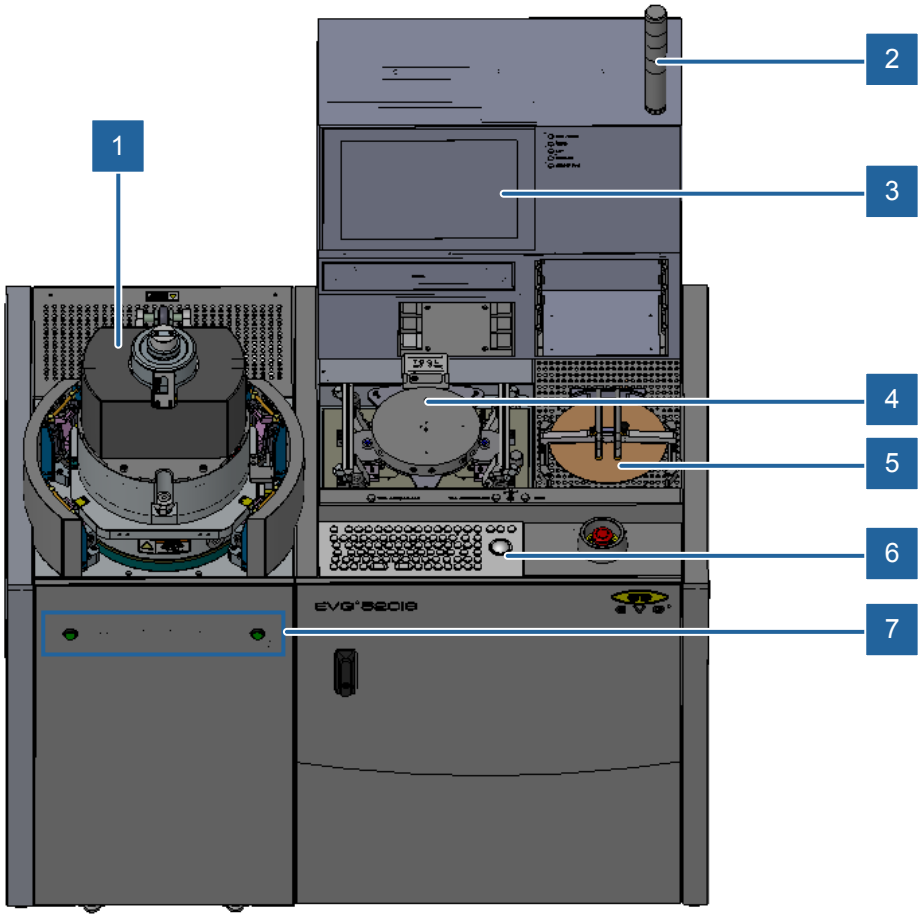

Figure 1 - System Layout

1	Bond Module	2	Signal Lights
3	PC Monitor	4	Chill Module
5	Handling Tool	6	User Interface
7	Cover open/close button (if equipped)		

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1.1.1 User Interface

The keyboard and trackball on the user interface can be used to control the system PC.

Figure 2 - Keyboard Layout with Trackball

1	Left Trackball Button	2	Right Trackball Button
3	Trackball		

1.2 Safety

Refer to Interlock List to find a detailed description about the location and functionality of all safety interlocks (e.g. Emergency OFF Button) on the system.

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2 System Startup

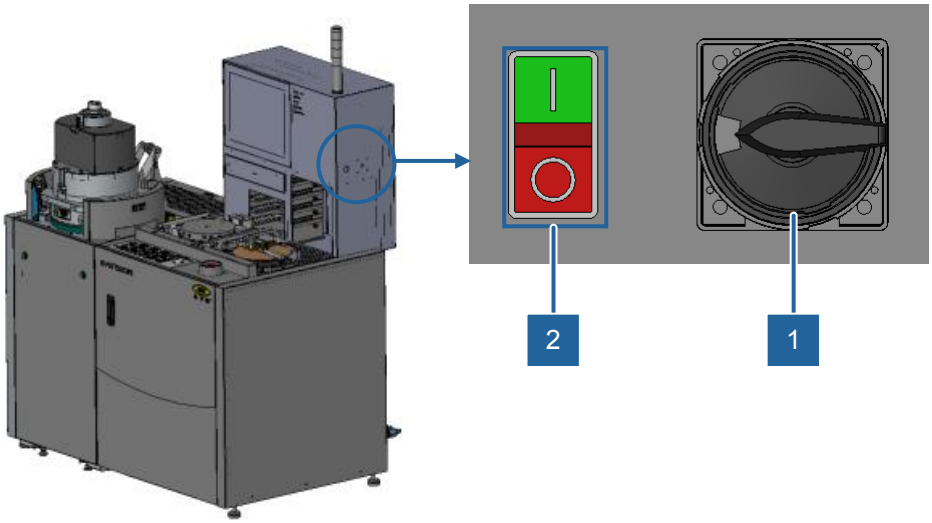

Figure 3 - Main Switch

1) Turn the main switch on the monitor (1) fully clockwise. If the three lamps above the switch are on the system is supplied with main voltage.
2) To the left of the main switch there is an emergency off button (2). The red button stands for OFF and the green button stands for ON. Press the green button.
3) Check if all circuit breakers are on.
4) In the center of the rack there is a key switch (Mini Environment). Turn mini environment key switches to “ON” (if equipped).

It is not necessary to switch on the PC separately.

As soon as the EVG Explorer appears the boot sequence is finished.

Login to the system software and initialize the system using the information provided in EVG Explorer and Framework manuals.

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3 GUI

After initializing the system, the Overview Jobs should look like below.

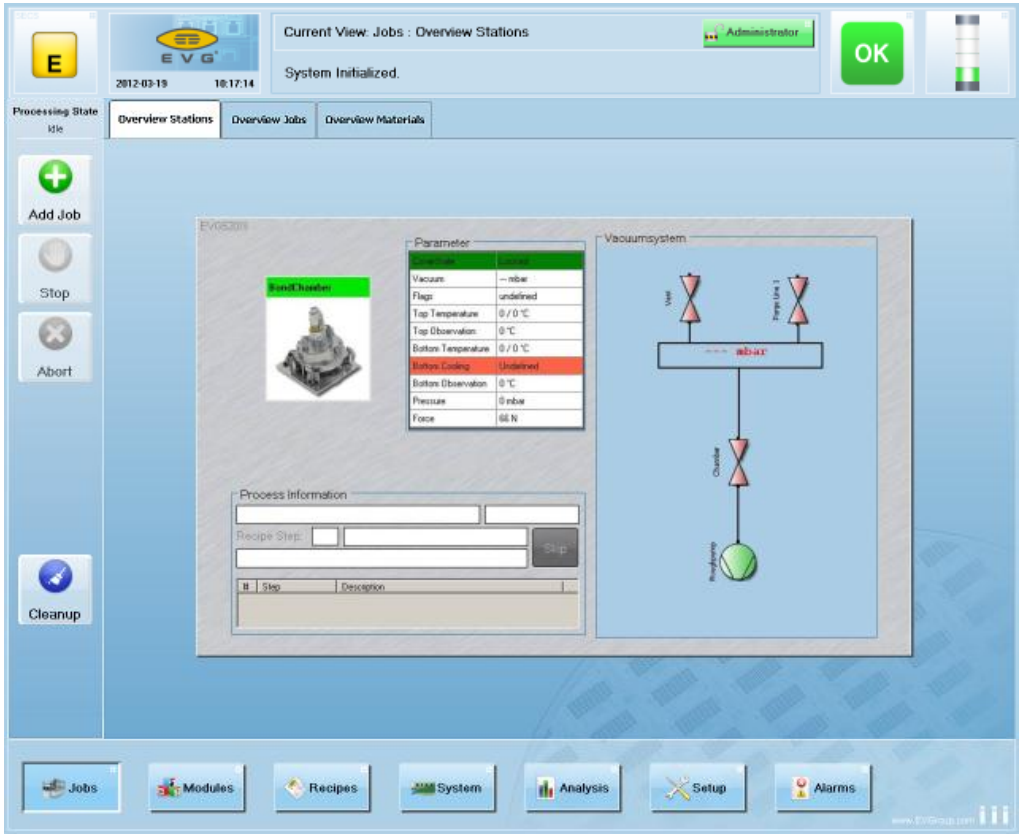

Figure 4 - Overview Stations

Refer to Framework and module manuals to find further information about the software.

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History

Date	Modification	by
2012-02-29	First written	HBA
2012-06-05	Updated GUI	HBA
2013-10-10	Formatted	HBA

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State:	Released		Author:	HBA
File:	EVG520IS+EVG520_StartUp_GN_eng_01.doc			
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De-embossing Station

Customer Support Documentation
EVG 520

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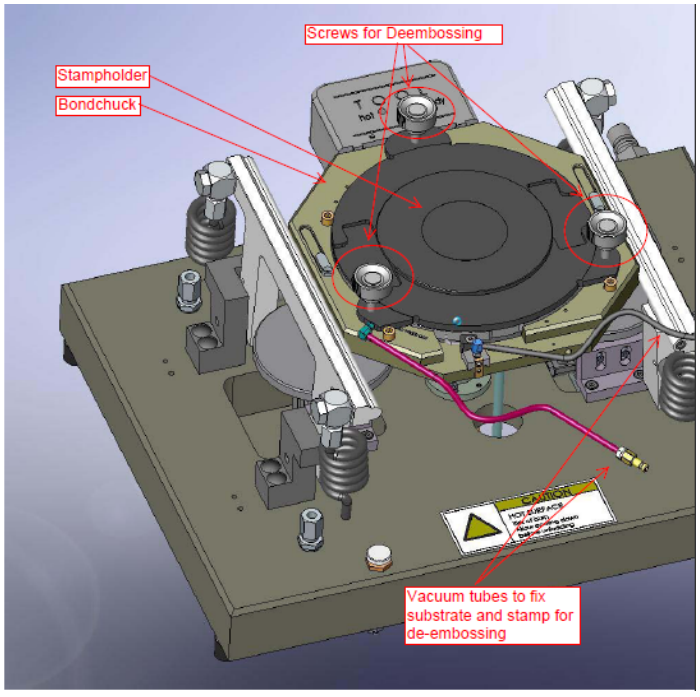
1 Process Flow for the De-embossing

1) Load substrate to Bond Chuck.
2) Insert separation flags (if equipped).
3) Load stamp to Bond Chuck.
4) Load stamp holder and clamp substrate and stamp ➔ if optically alignment is required step 1 to 3 will be done in the EVG6xx aligner.
5) Load bond chuck into bond chamber and start process.

<u>De-embossing process flow:</u>

1) Unload bond chuck and load onto cooling station (let the bond chuck cool down).
2) Connect vacuum tubes and turn on vacuum to fix substrate on bond chuck and stamp on stamp holder.
3) Unclamp stamp holder and use the 3 screws to de-emboss (separate) stamp from substrate.
4) Use handling tool for stamp holder to unload the stamp holder.
5) Turn off substrate vacuum and unload substrate.
6) Load next substrate for the next process or turn off stamp vacuum and unload stamp.



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History

Date	Modification	by
2012-10-09	First written	STM

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State:	Released		Author:	STM
File:	EVG520_Deembossing Station_eng_01.doc			
Created on:	2012-10-09		Printed on:	2012-10-17
Version:	2.0		Last revision	2011-11-18
Purpose:	Operation		Language:	EN

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EVG Explorer

Customer Support Documentation
EVG

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1 Overview

After starting the system the EVG Explorer will be started:

Figure 1 - EVG Explorer

1	Title Bar
2	Main Area
3	Task Bar

1.1 Title Bar

The title bar displays the EVG system (e.g. “EVG620”):

Figure 2 - Title Bar

1.2 Main Area

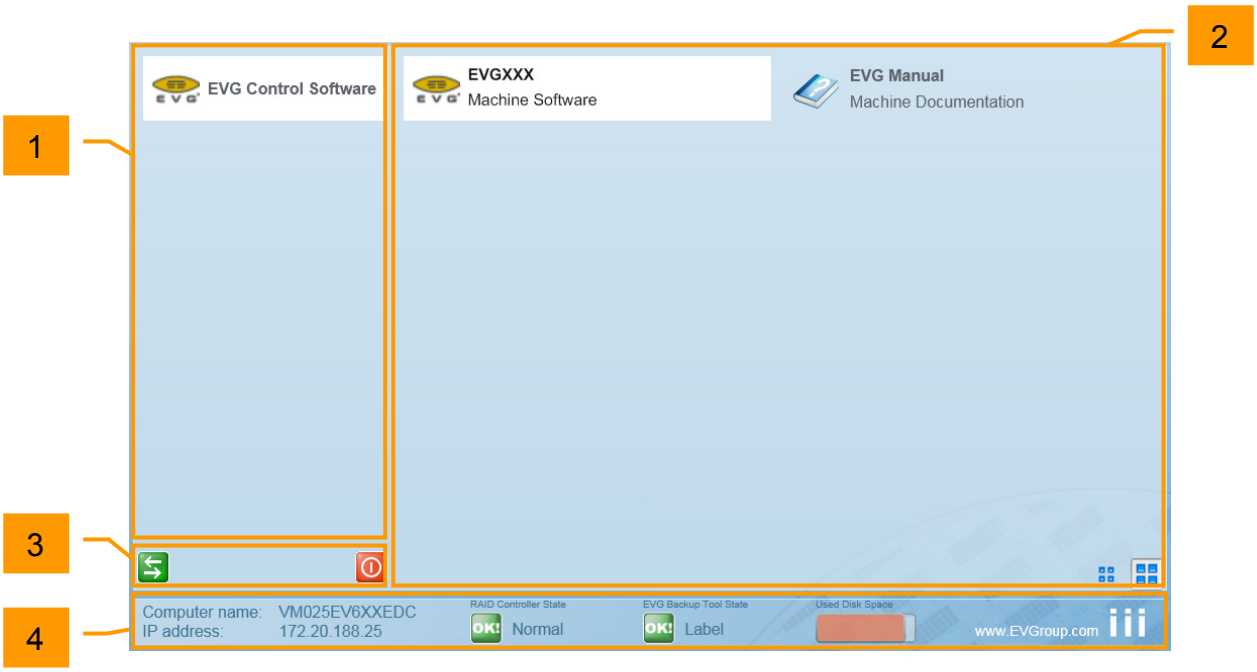

Figure 3 - Main Area

1	Application groups
2	Applications in the selected group
3	Operating system controls
4	Status bar

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1.2.1 Application Groups

This section displays the list of application groups available to the user currently logged in.

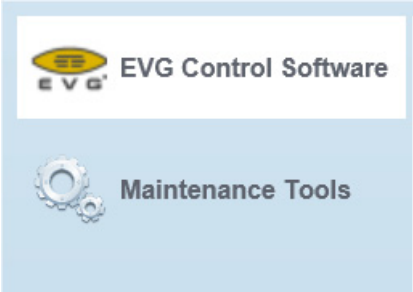

Figure 4 - Application Groups

The currently selected application group is highlighted by a white background.

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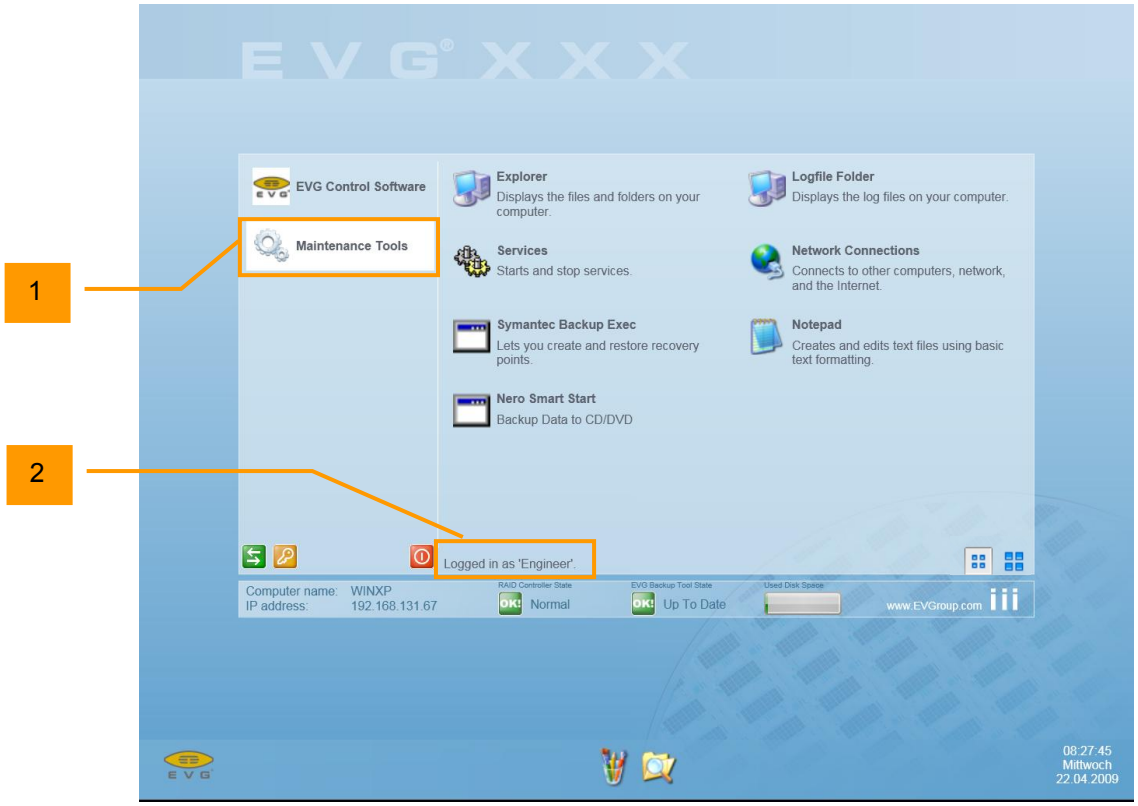
1.2.1.1 Maintenance Tools

Only maintenance and service engineers have access to the maintenance tools.

The Maintenance Tools: click here to open special Tools needed for Maintenance like Explorer, Services or Notepad.



1	Maintenance Tools
2	User name as “Engineer”

Use the following information to log in as an Engineer:

User name: Engineer

Password: engineer

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1.2.2 Applications

This section displays all applications in the currently selected application group that are available to the user that is currently logged in.

To start an application, double-click on it or select it and press “Enter”.

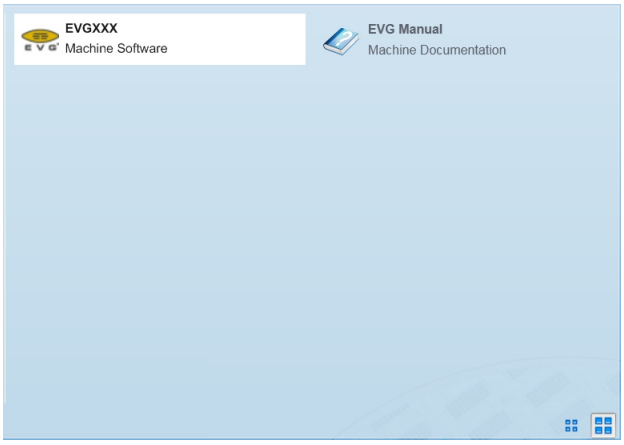
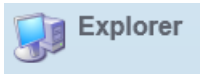
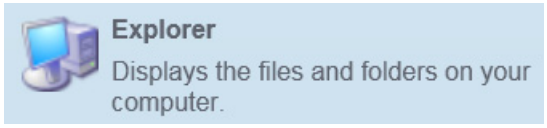


Figure 5 - Applications

On the lower right corner of the applications area, the icon size can be set to small or large (default) by clicking on the following buttons:

Icon:	Description:	Example:
	Small icons: will only display the application title	
	Large icons: will display application title and description	

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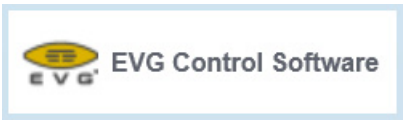
1.2.2.1 EVG Control Software

The application group “EVG Control Software” is available to every user group.



The following applications can be found in the application group “EVG Control Software”:

Application:	Description:
EVGXXX Machine Software	opens system software
EVG Manual Machine Documentation	opens system documentation

1.2.2.2 Maintenance Tools

Maintenance Tools is available to engineer level or higher.

The application group “Maintenance Tools” contains special tools needed for maintenance (e.g. Explorer, Services or Notepad).

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1.2.3 Operating System Controls

Depending on user level the following controls are available:

Change EVG Explorer user

Log off EVG Explorer user

Shut down

1.2.3.1 Login / Change User

Click the “Change user” button to login or change user.

In the dialog window enter the user name and password and click on “OK” to confirm.

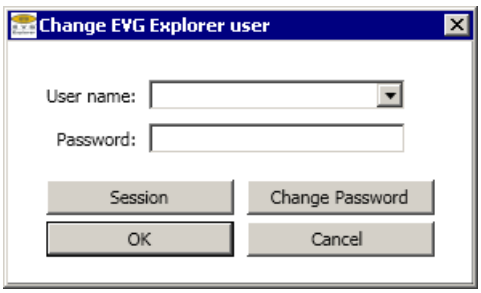

Figure 6 - Change User

1.2.3.2 Log Off

Click on to log off.

1.2.3.3 Shut Down

Click on the “Shut down” button .

In the dialog window select the action that should be performed and click on “OK” to confirm.

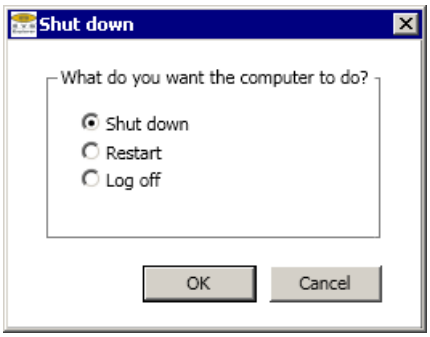

Figure 7 - Shut Down

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1.2.4 Status Bar

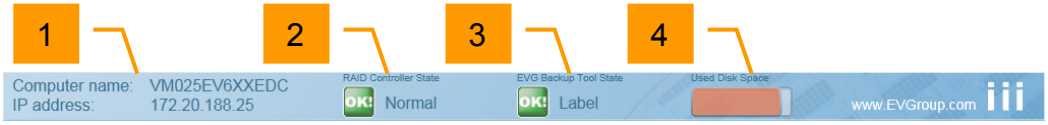

Figure 8 - Status Bar

1	Computer name: VM025EV6XXEDC IP address: 172.20.188.25	Information about the computer
2	RAID Controller State OK! Normal	Displays the current RAID Controller State:
		green icon: OK! Normal
		orange icon: Rebuilding/Migrating/Verifying
		red icon: Failed/Degraded
3	EVG Backup Tool State OK! Label	Displays the current EVG Backup Tool State:
		green icon: OK! Up to date
		orange icon: Unknown
		red icon: Out of date
4	Used Disk Space	Currently used disk space.

1.3 Task Bar

Figure 9 - Task Bar

1.3.1 EVG Icon

Left-click	Show EVG Explorer and minimize all open windows.	
Right-click	About	Information about the EVG Explorer, the Operating System and the version number.
	Screenshot	Save a Screenshot to the computer
	Show Desktop	Show EVG Explorer and minimize all open windows.

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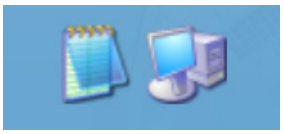
1.3.2 Running Applications

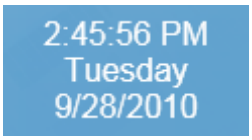
All running applications are displayed here. Moving the mouse cursor over an icon will show the application name.



Left-click on an icon to open the corresponding application or right-click on it to open the context menu (to show, minimize, close or kill the application).

1.3.3 Date and Time

Displays the current date and time. The date and time are formatted according to the current date and time format settings in Windows.



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2 “EVG Remote Support” Tool

Open “Maintenance Tools” (1) and double-click on “EVG Remote Support” (2) to start the tool:

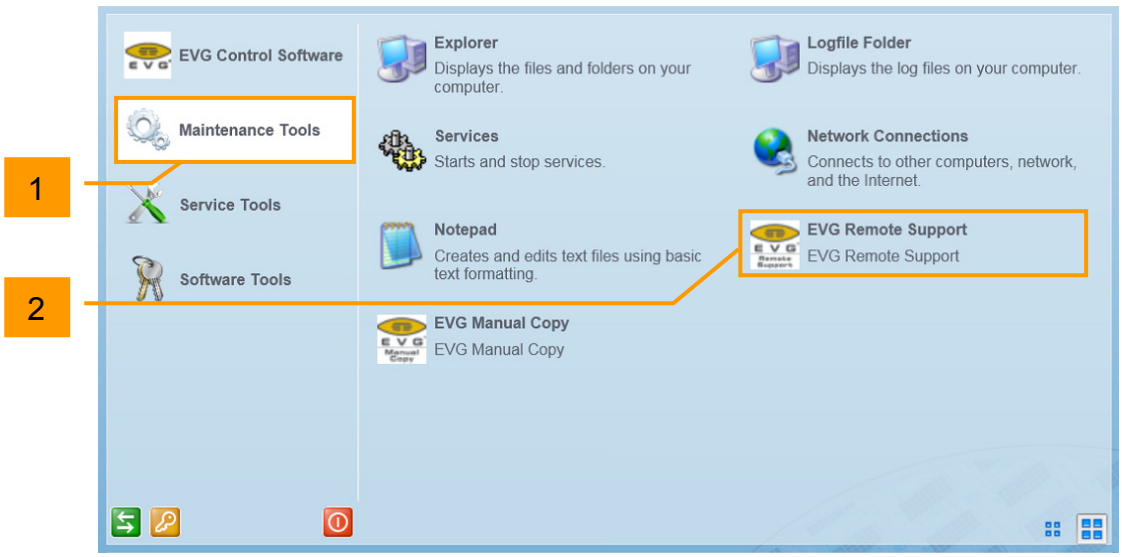

Figure 10 - EVG Remote Support

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2.1 EVG TechSupport offline

The EVG Remote Support Tool is started, but the EVG TechSupport is offline.

- Call EVG TechSupport for assistance (Phone: +43 7712 5311 3000)
- Cancel the operation and retry, when operator is available

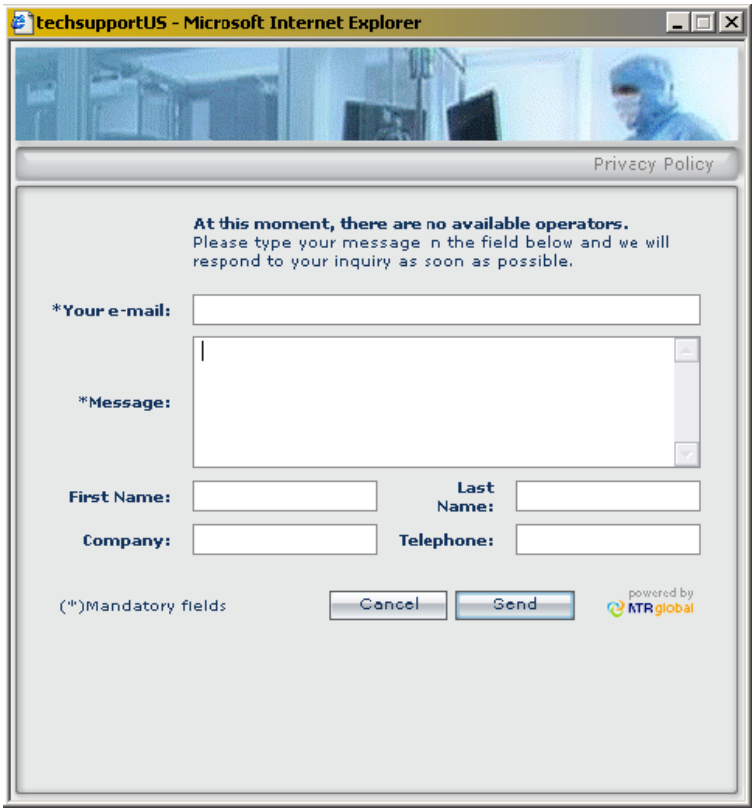

Figure 11 - EVG Remote Support Tool

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2.2 EVG TechSupport online

The EVG Remote Support Tool is started and the EVG TechSupport is online.

Enter a text in bottom message box and click on the button „Send“.

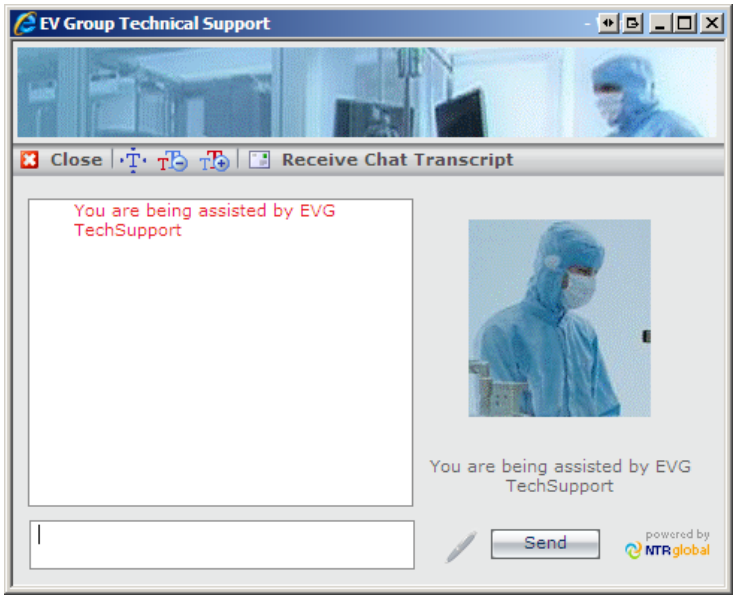

Figure 12 - EVG Remote Support Tool

Remote Connection to client computer

- Choose „Accept“ to permit the access
- Choose „Cancel“ to refuse the request

Figure 13 - Remote connection request by operator

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2.3 Benefits

- Secure 256 bit AES encrypted connection
- No software installation needed (at customer site)
- Fast response time
- Remote failure diagnostics / troubleshooting
- Simple application
- Session initiated by customer
- Customer needs to approve every data transfer

2.4 Requirements

- Access to http://www.evgroup.com/en/onlinesupport
- Firewall Ports
  - 80
  - 443
  - 11438

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3 “EVG Manual Copy” Tool

3.1 Copy Manual

Open “Maintenance Tools” (1) and double-click on “EVG Manual Copy” (2) to start the tool:

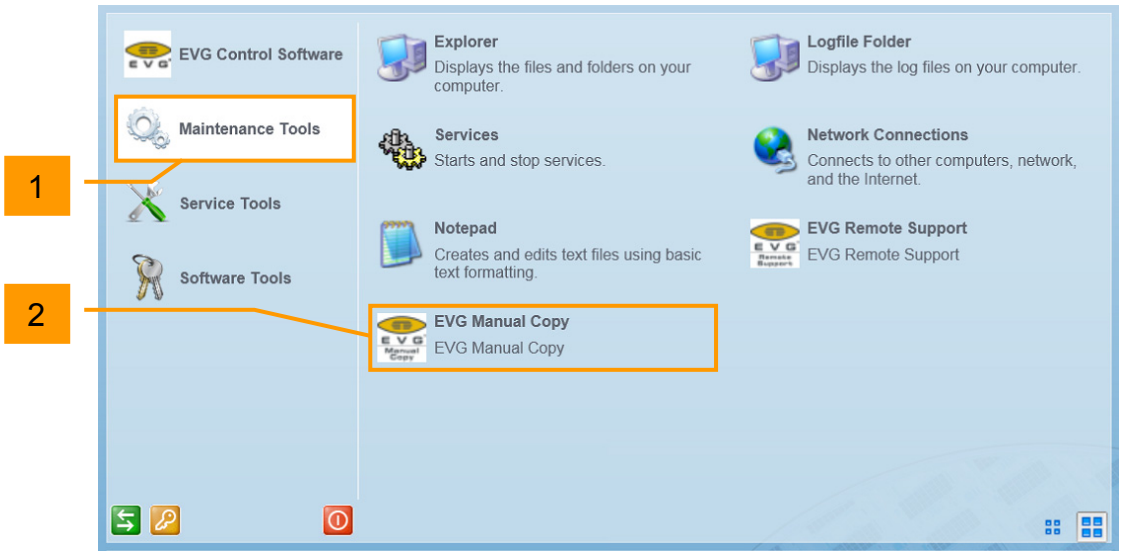

Figure 14 - Starting EVG Manual Copy

Insert the documentation CD into the CD drive and select the correct drive in the tool (1). Afterwards click on “Copy” (2):

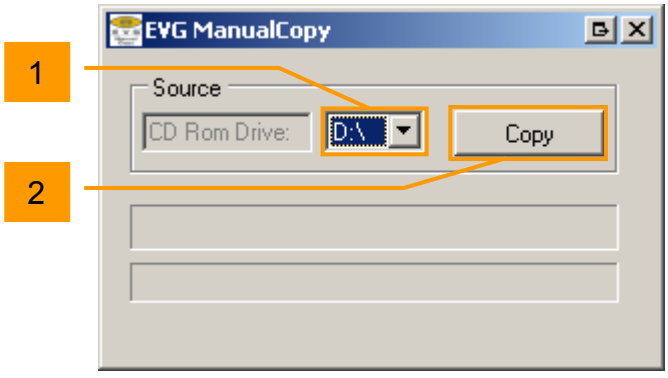

Figure 15 - EVG Manual Copy Process

Note: EVG Manual Copy requires engineer login level or higher.

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3.2 Open Manual

Open "EVG Control Software" (1) and double-click on "EVG Manual" (2) to start the tool:

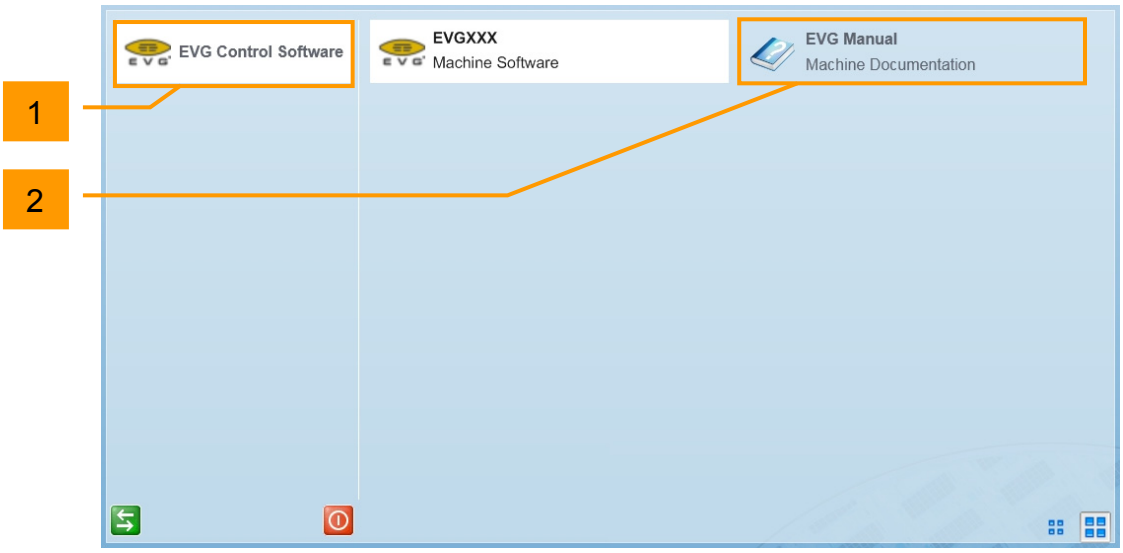

Figure 16 - Opening EVG Manual

Note: EVG Manual can be opened by any user group.

3.3 Troubleshooting

Error:	Possible cause:	Solution:
"Copy Process failed: The device is not ready." 	No CD in the CD drive selected.	Make sure that the documentation CD is inserted in the CD drive selected in the Manual Copy tool.
	Wrong CD in the CD drive selected.	

If the above steps do not help to resolve the problem, please contact EV Group Support.

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History

Date	Modification	by
2009-04-22	First written with EDC	STZ
2009-07-22	Added and updated screenshots	STZ
2009-08-25	Updated screenshots	STZ
2010-09-29	Reworked and added Remote Support, Manual Copy	WAA

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File:	EVG_Explorer_eng_04_extern.doc			
Created on:	2009-07-22		Printed on:	2011-04-21
Version:	4.0		Last revision	2009
Purpose:	Operation		Language:	EN

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EVG CIMFramework - Core

Customer Support Documentation
EVG

EV Group
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1 Start Up

1.1 Login

1) After starting the system the EVG Explorer is opened. Double-click EVG CIMFramework.

Figure 1 - EVG Explorer

2) Wait while EVG CIMFramework is loading.

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3) Enter the **User Name** and **Password** in the login window and click **Login** to confirm.

Figure 2 - EVG CIMFramework Login

After a successful login the **Overview Stations** of the window **Jobs** will be displayed.

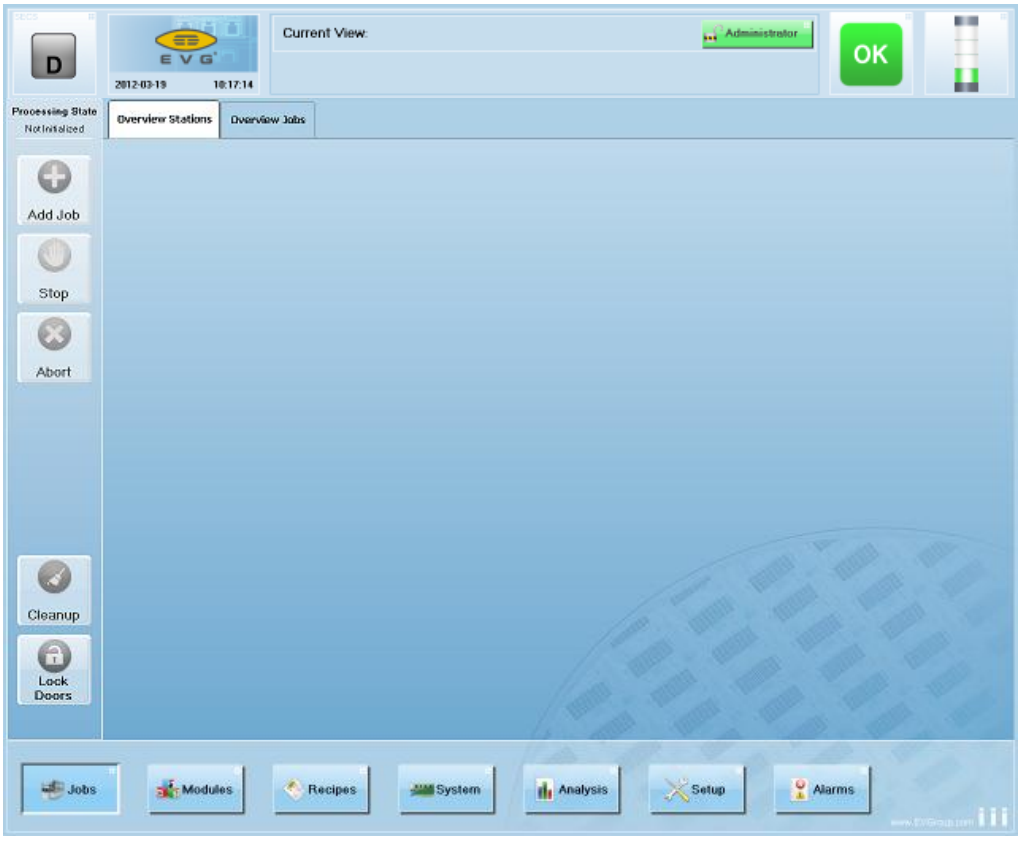

Figure 3 - Jobs – Overview Stations

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1.2 Initialize

Click **System** in the bottom navigation bar.

The window **Overview** in **System** will be opened.

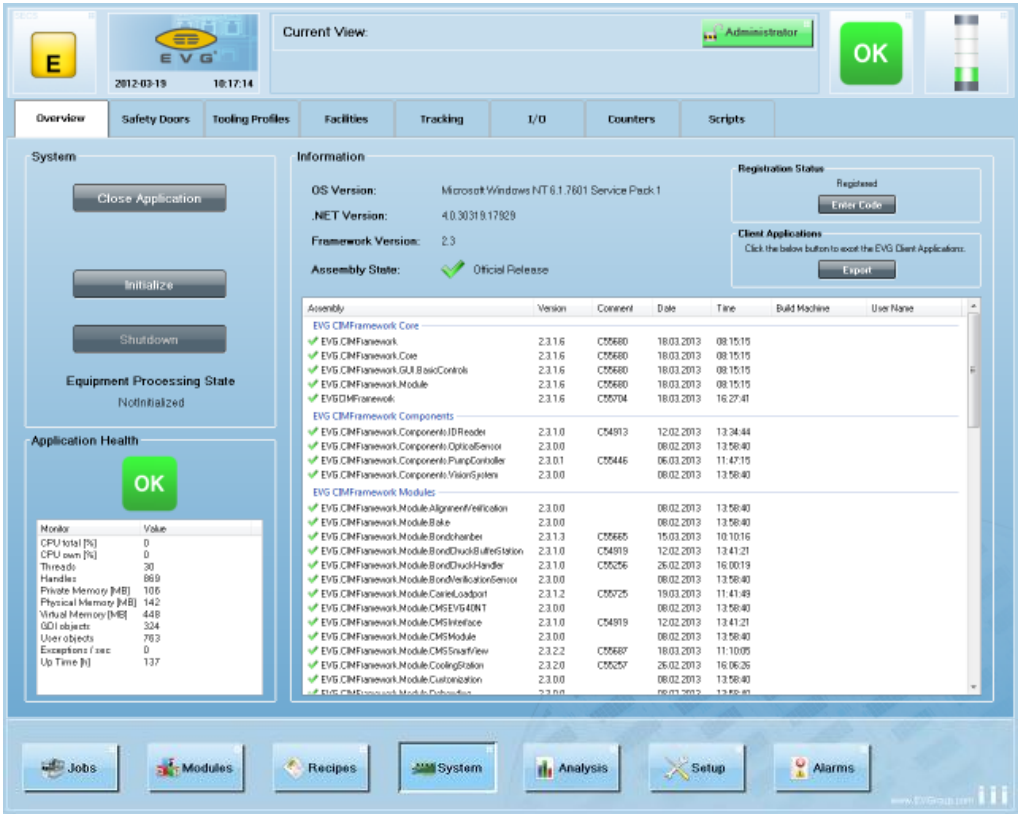

Figure 4 - System - Overview

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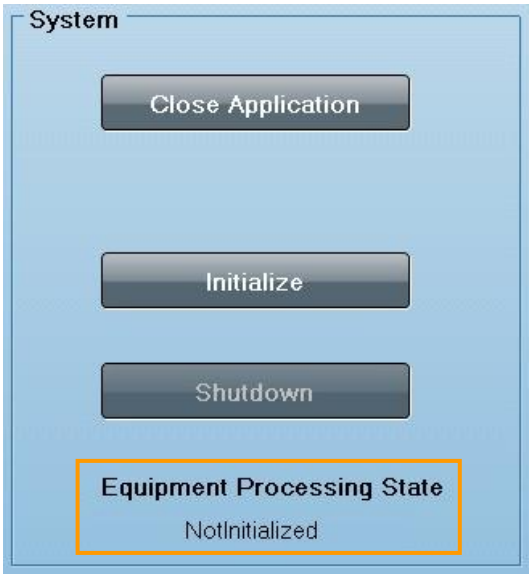
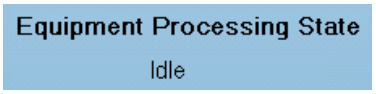
In the **System** frame there is an area displaying the current **Equipment Processing State**.



Click the following button to initialize the system.

While the system initializes the **Equipment Processing State** is **Initializing**.

As soon as the state is **Idle** the initializing process is finished and the software can be used to operate the system.



Note: All safety doors have to be closed to be able to initialize the system (they will be locked automatically)!

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1.3 Equipment Processing State

The following overview lists all possible equipment processing states and how they interact.

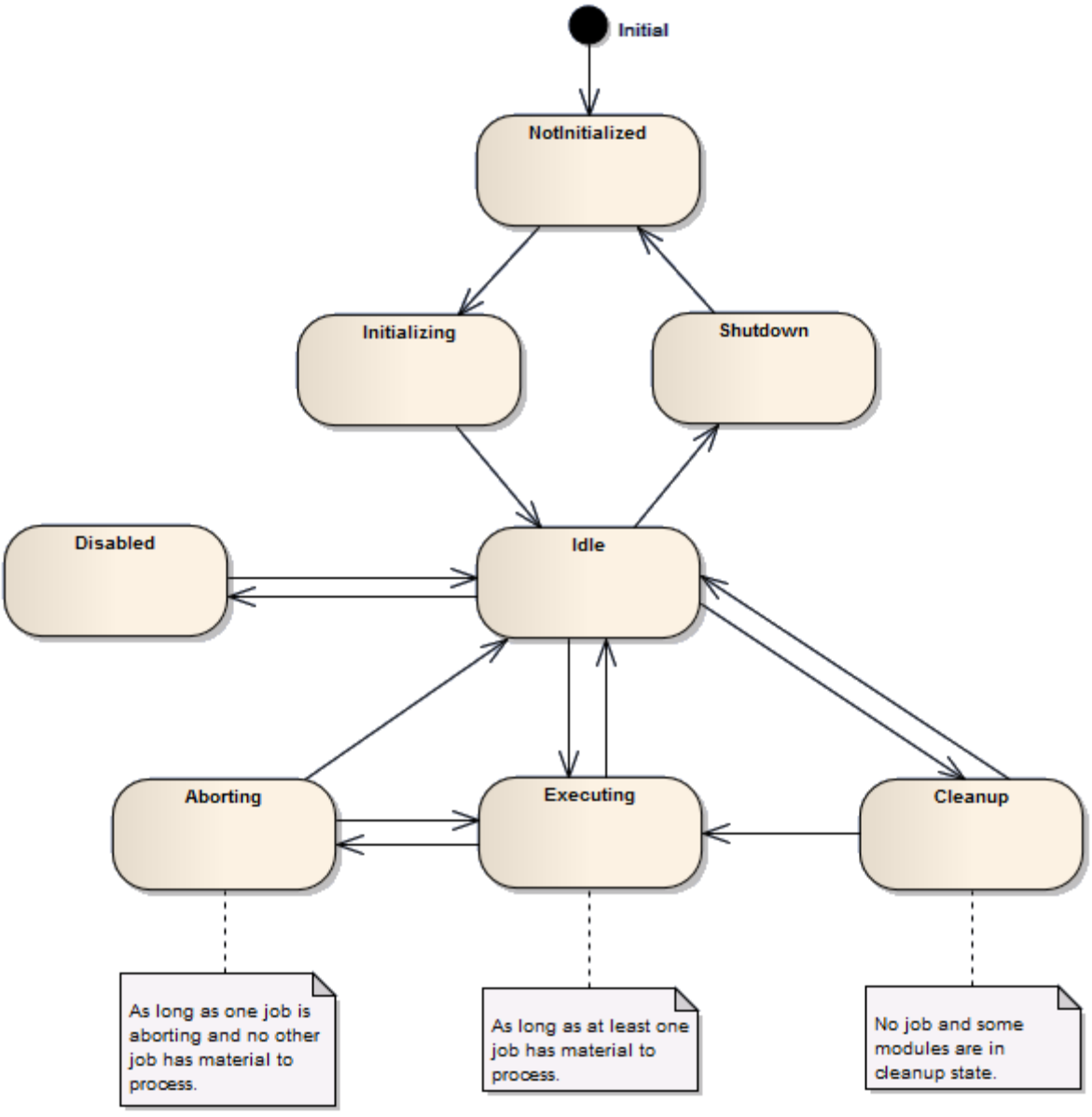

Figure 5 - Equipment Processing State

Refer to the following chapters to find detailed descriptions of all module states.

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1.3.1 Disconnected State

- Module is physically disconnected (optional).
- Module is ignored and not controlled by the equipment.
- Is entered and left when instructed by the user.

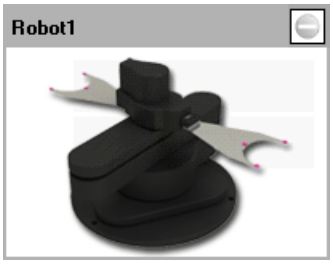

Figure 6 - Disconnected State

Right-click a module and select **Connect** to switch from disconnected to connected state (or **Disconnect** to switch from connected to disconnected state).

Figure 7 - Connect Module

1.3.2 Disabled / Not-Initialized State

- Module is out of service but under control by the equipment.
- Module is automatically initialized on equipment initialization.
- Is entered automatically on equipment shutdown, module failure or when instructed by the user.

Figure 8 - Disabled State

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Right-click a module and select **Enable** to switch from disabled to enabled state (or **Disable** to switch from enabled to disabled state).

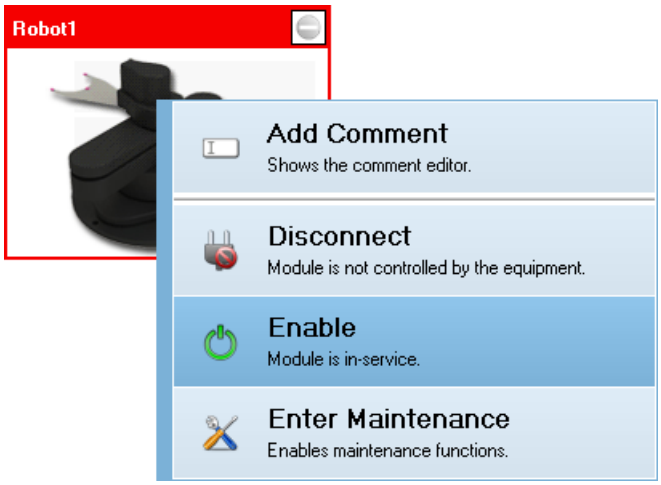

Figure 9 - Enable Module

1.3.3 Ready State

- Module is ready for executing or cleanup.
- Ready state is entered after successful module initialization.
- Minimized set of high-level commands for operation.

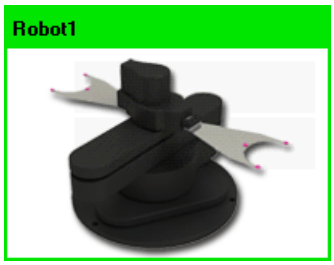

Figure 10 - Ready State

Right-click a module in “Ready” state to find a limited set of high-level commands for operation.

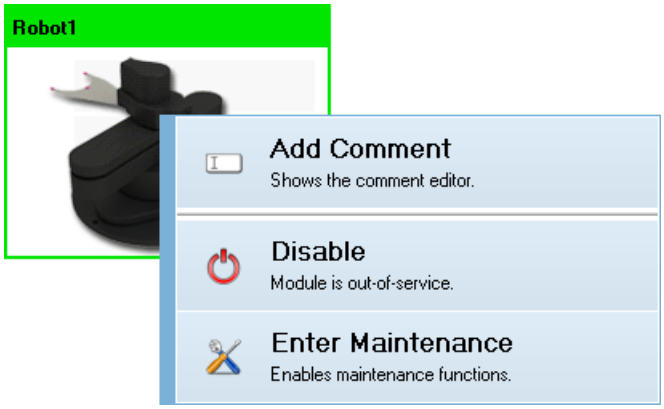

Figure 11 - Ready State Menu

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1.3.4 Maintenance Mode

- Module is not available for executing or cleanup.
- Maintenance mode is entered and left by selecting the command from the high-level menu (see below).
- It can be entered prior and after module initialization.
- It offers a maximized set of high-level commands for maintenance.

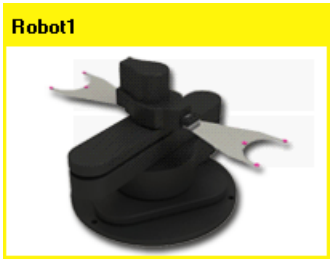

Figure 12 - Maintenance Mode

Click a module in **Maintenance Mode** to find further high-level commands (e.g. for maintenance).

The following example illustrates how an additional function is available in Maintenance Mode (Test & Train). This function is only available in Maintenance Mode.

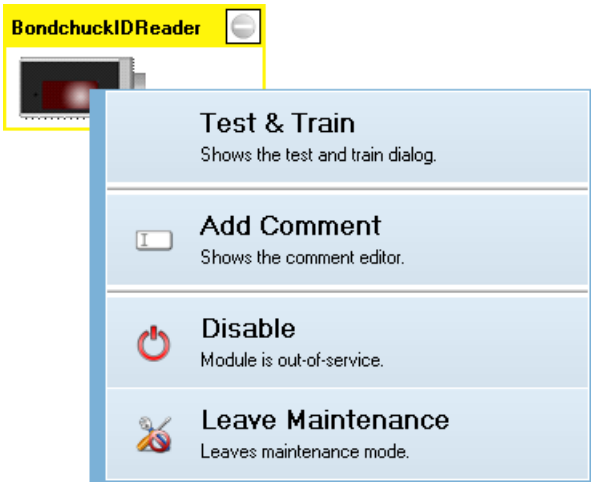

Figure 13 - Maintenance Mode Menu Example

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1.3.5 Executing State

- While in **Executing** state, the module is in use by the equipment to finish the current job or to perform a cleanup.
- It is entered automatically on demand.
- It is left automatically if the module is no longer required.

Executing, waiting for material:

Executing and processing a material:

1.3.6 Cleanup State

- A cleanup is required if there is a material on any module without it being dedicated to any specific job.
- It is entered automatically on an equipment cleanup cycle usually triggered by the user.
- It is left automatically after the material is removed.

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2 GUI

The basic layout of every window in EVG CIMFramework is divided into the following three parts:

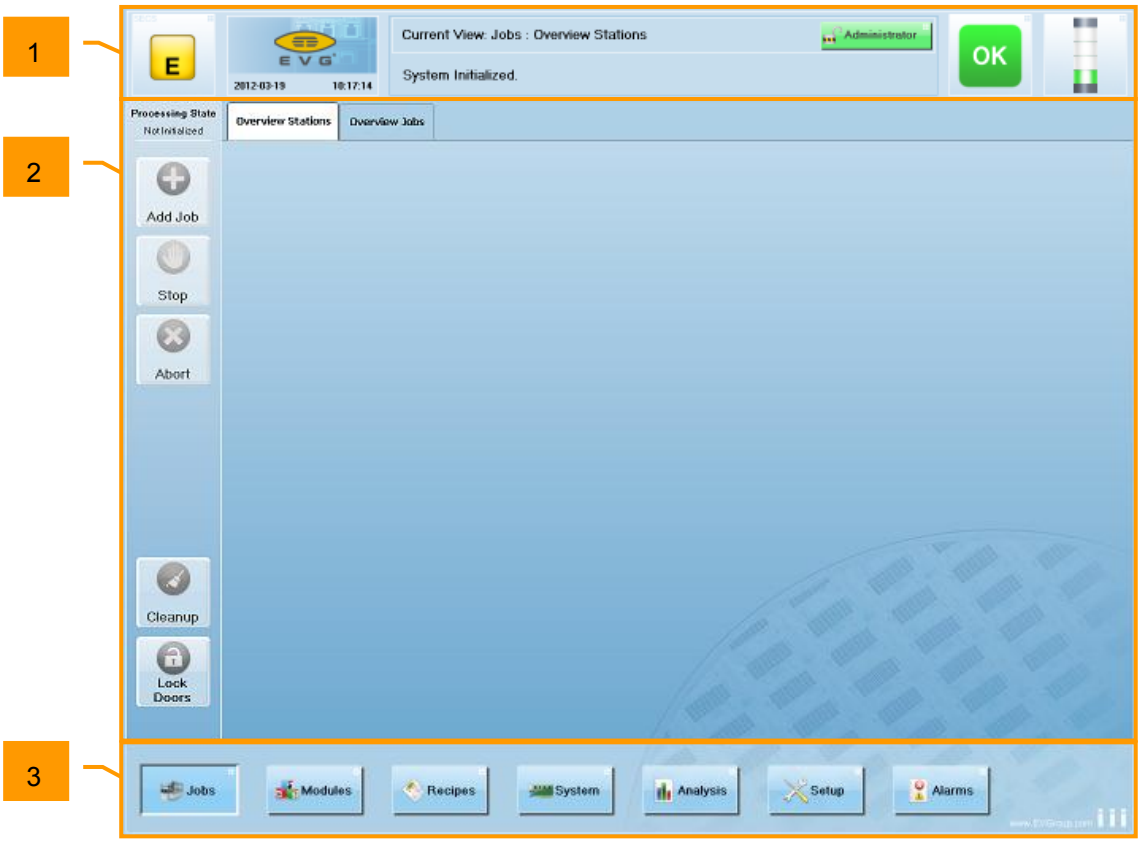

Figure 14 - Basic Layout

1	Status information
2	Content of the current window (e.g. “Jobs”)
3	Navigation bar

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Status Information

The status information is located on the top of the screen. It is always visible while working with the EVG CIMFramework and it is used to find all important status information about the system while operating it.

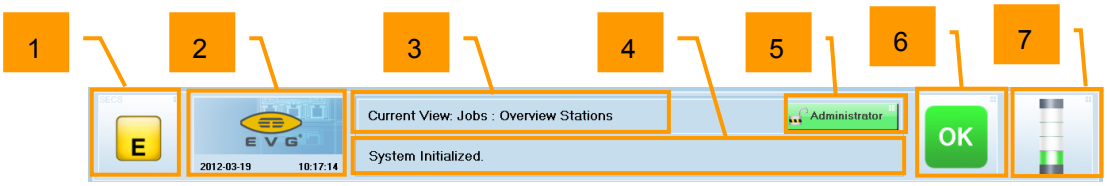

Figure 15 - Status Information

1		SECS-GEM status icon: click here to open the SECS-GEM communication window.
2		Current system date and time. Date format: YYYY-MM-DD Time format: HH:MM:SS
3		Displays the “current view” (which window and submenu is currently opened). E.g. “Current View: Jobs: Overview Stations”
4		Displays the current status of the system (e.g. “System Initialized.” or “Recipe … loaded”).
5		Log out button (displays the name of the user currently logged in).
6		Current system status (e.g. “OK”). If the status is not “OK” it can be checked in the alarm window. By clicking on this icon the alarms window will be opened directly.
7		The light tower icon represents the light tower on the system indicating the current status of the system (e.g. error).

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Navigation Bar

The navigation bar is located at the bottom of the screen. It is always visible while working with the EVG CIMFramework and can be used to toggle between the main windows.

Figure 16 - Navigation Bar

Menu item:	Description:
	Displays overview and settings of all stations, jobs and materials. Depending on the user group certain high-level commands can be executed by using the context menu of the modules.
	A detailed overview of all modules in the system can be found here. In the Modules information view the Equipment State, Process State and measurement results for the different modules are displayed.
	Allows the user to create and edit existing recipes.
	Displays detailed overview and settings of hardware via low level and also contains settings for “Recipe Namespace”.
	Displays a list of the system log information (e.g. debug, warning or error messages).
	Every module in the system can be configured here (e.g. Light Tower Settings, Robot Handling System). It can be seen as an interface between software and hardware of the system
	Can be used to find a list of all events, alarm conditions and error conditions.

Note: Available menu items depend on access rights.

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2.1 Jobs

Click **Jobs** in the bottom navigation bar:

The **Overview Stations** of **Jobs** window will be opened. The modules displayed vary depending on system configuration. The following example displays three cassette stations and a robot module with a prealigner.

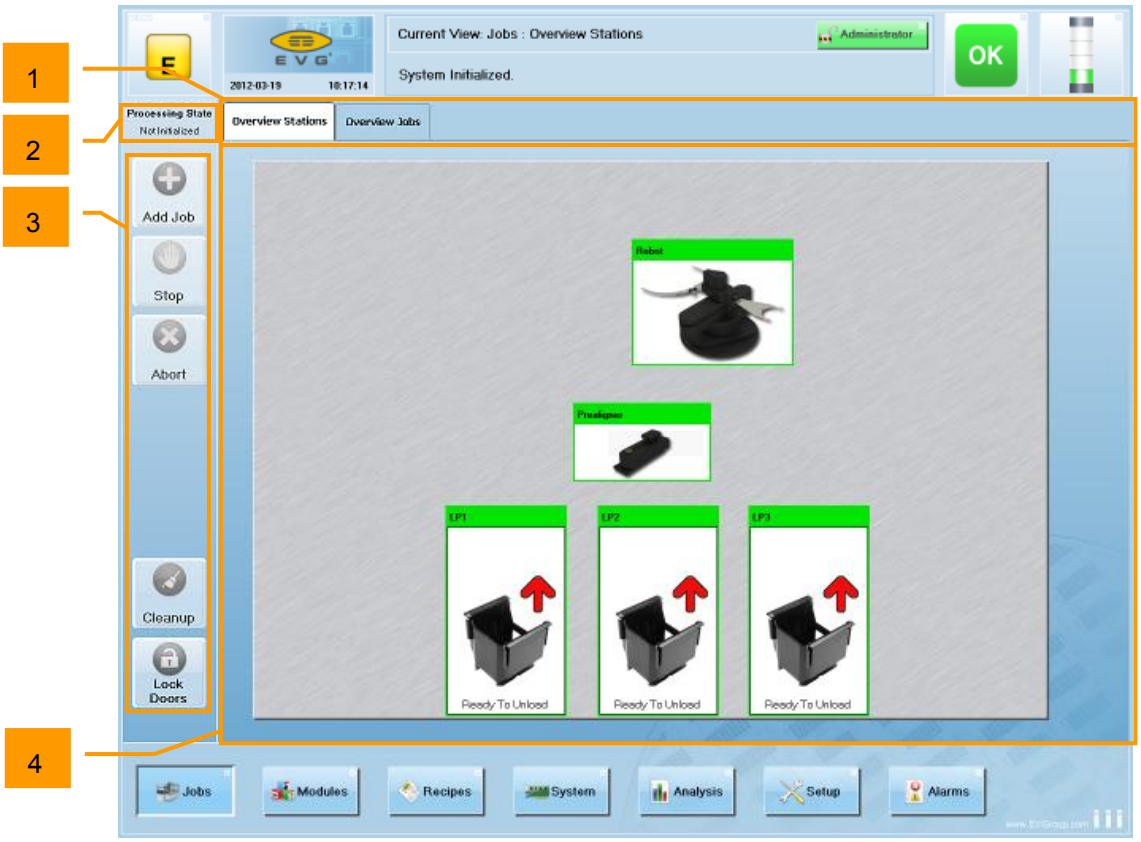

Figure 17 - Jobs - Overview Stations

1	Submenu items
2	Processing State
3	Process Functions
4	Overview Stations

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2.1.1 Overview Stations

The **Overview Stations** displays an overview of all modules in the system (e.g. Robot Module). The following overview shows an example module setup. The modules displayed vary depending on system configuration.

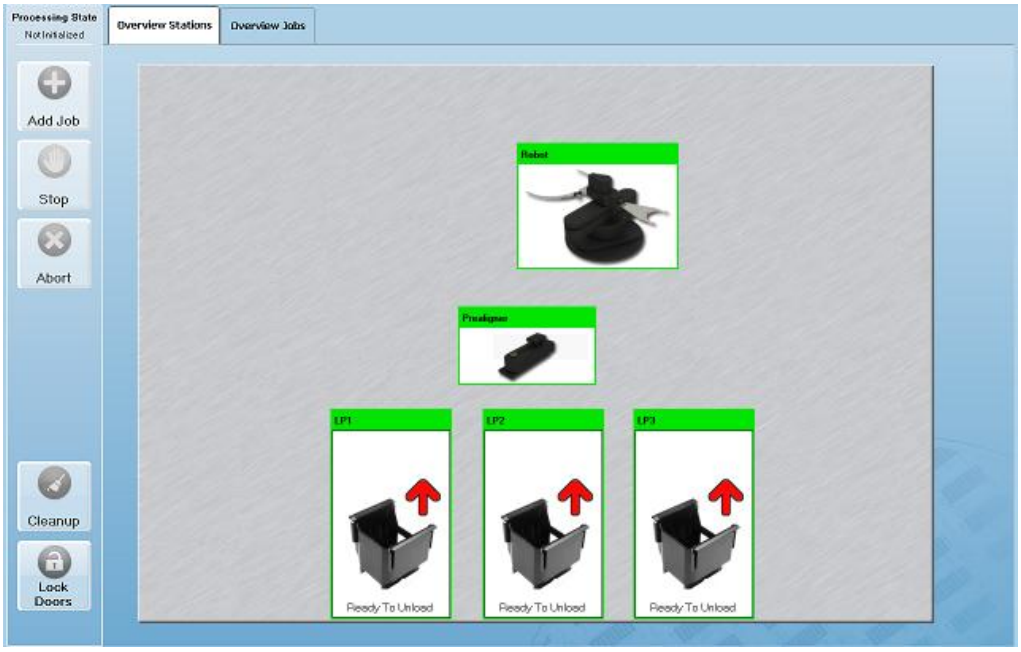

Figure 18 - Overview Stations

Click a module in **Overview Stations** to open its context menu. It can be used to access certain high level functions and settings depending on the module (available options also depend on user permissions):

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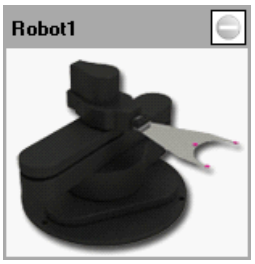
2.1.1.1 Station Status

The current station status is indicated by its border color. Refer to the following examples to find all module states.

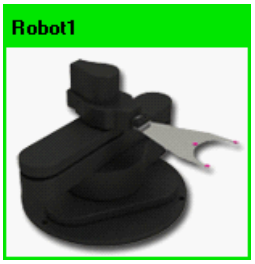
Disconnected:



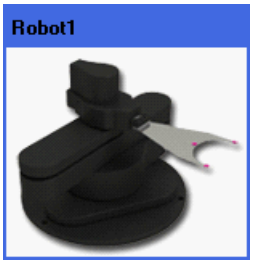
Disabled:

While Initializing:

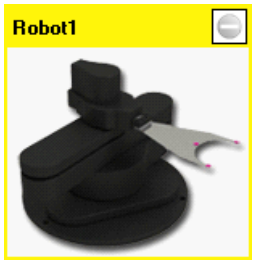
Enabled (ready):



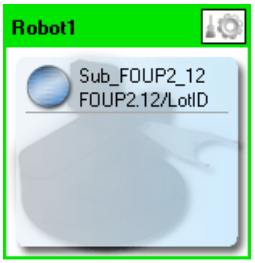
While Disabling:



Maintenance Mode:

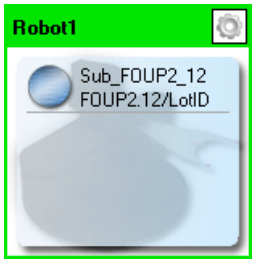


Cleanup:



Executing (without material):

Executing (with material):



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2.1.1.2 Multiple Slot Modules

Modules with multiple slots offer settings for single slots (sub modules) and for the entire module.

The following example of a buffer station module shows the basic function principle of multiple slot modules. The detailed description for each module can be found in the corresponding module manuals.

Entire Module (click on the border):

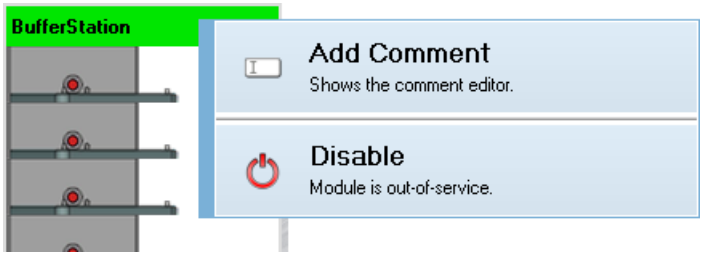


Figure 19 - Module Context Menu

One Slot (click on the slot):

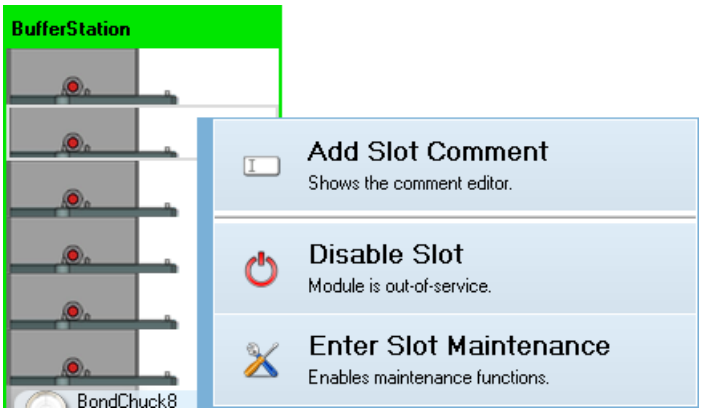
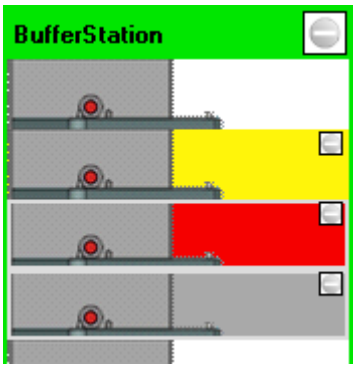


Figure 20 - Slot Context Menu

The current slot state is visualized with a colored background.

Slot states:



Idle state (ready, enabled and initialized)

Maintenance Mode

Disabled Slot

Disabled and disconnected Slot

Figure 21 - Slot States

2.1.2 Overview Jobs

The **Overview Jobs** tab contains a list of all queued, active and completed jobs.

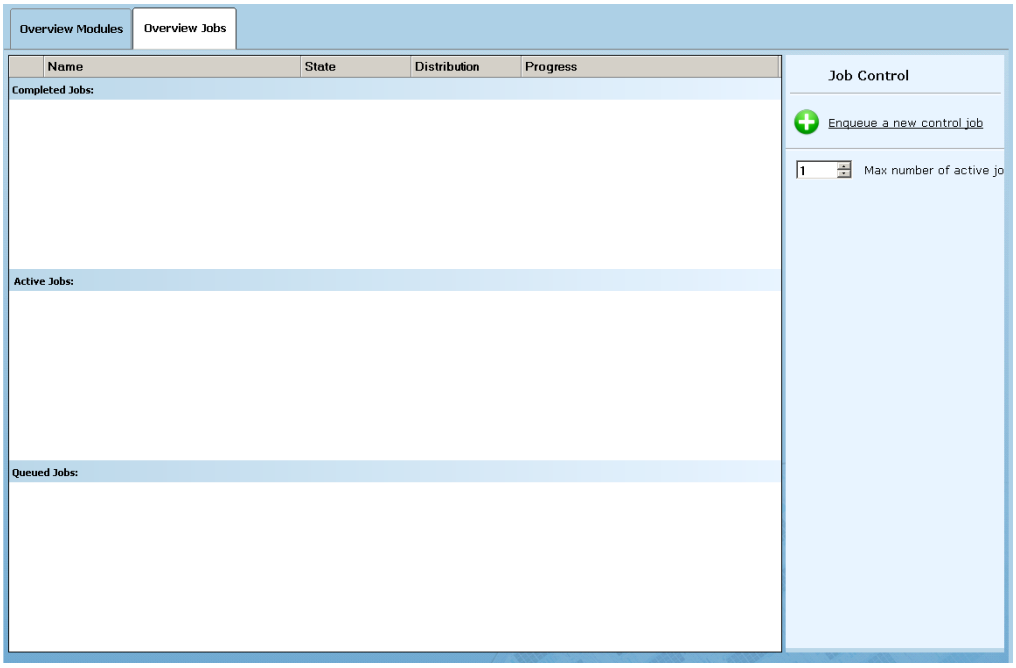


Figure 22 - Overview Jobs

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2.2 Modules

Click **Modules** in the bottom navigation bar:

The **Modules** window contains a detailed overview of all modules in the system.

2.2.1 Example: Robot Handling System

The following example shows the basic purpose of the module windows. The module window of **Robot Handling System** can be used to operate the robot (e.g. switch between “Normal Mode”, “Safe Mode” and “Train Mode” or to open the “GencoBot ToolBox”).

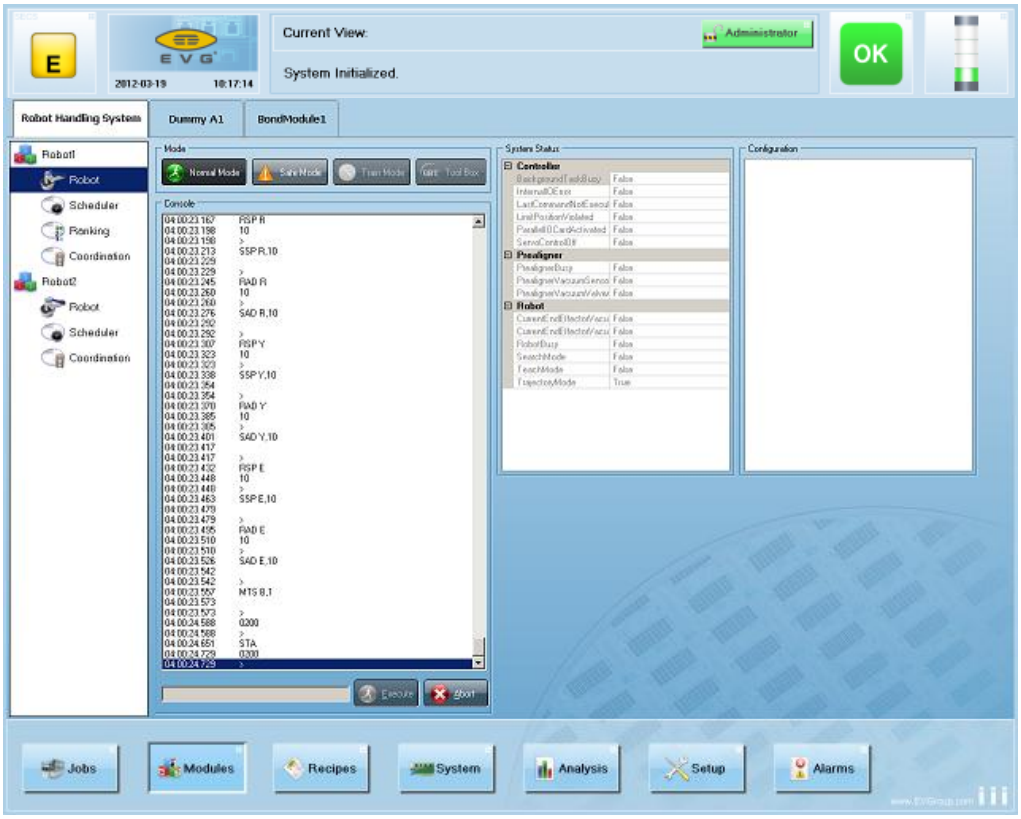

Figure 23 - Modules: Robot Handling System

Note: Available module windows vary depending on system configuration (e.g. “Robot Handling System” is only available on fully automated systems).

2.3 Recipes

Click **Recipes** in the bottom navigation bar:

The **Recipes** window will be opened:

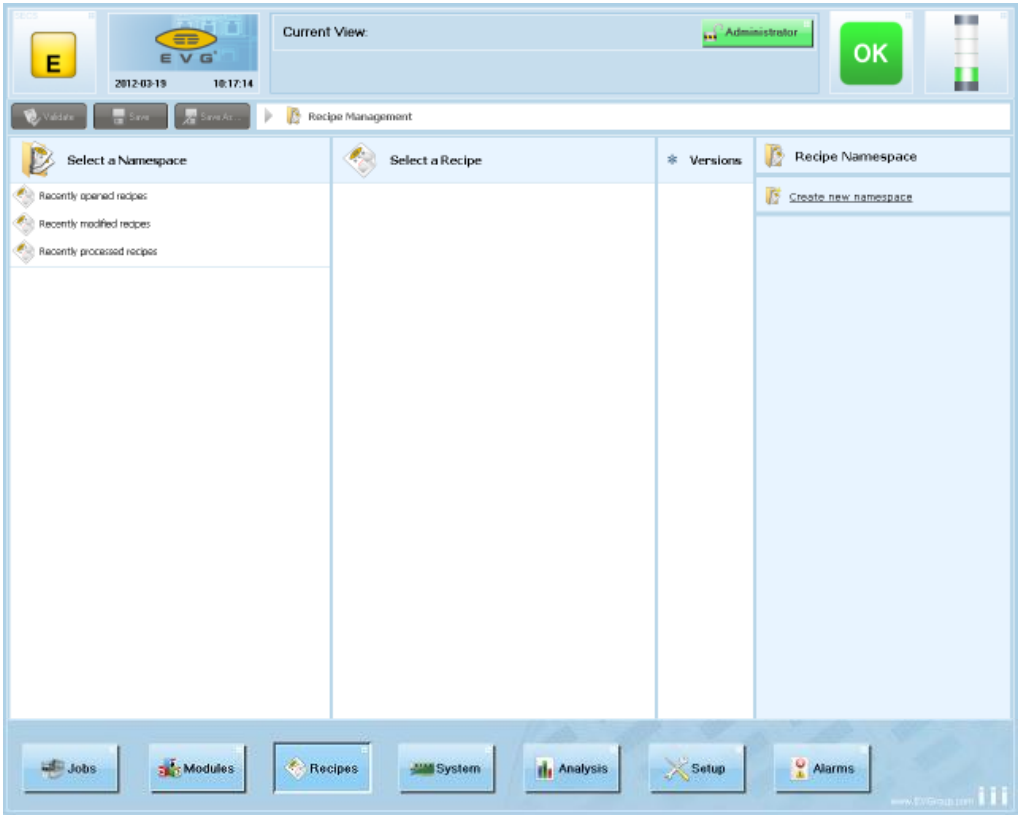

Figure 24 - Recipe Window

In the screenshot above the **Recipes** window is empty because no recipe is opened.

Refer to chapter **4 Recipe Programming** to find further information about how to work with recipes and refer to module-specific **Recipe Programming** manual (if available) to find out how to work with recipes.

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2.4 System

Click **System** in the bottom navigation bar:

The **System** window will be opened:

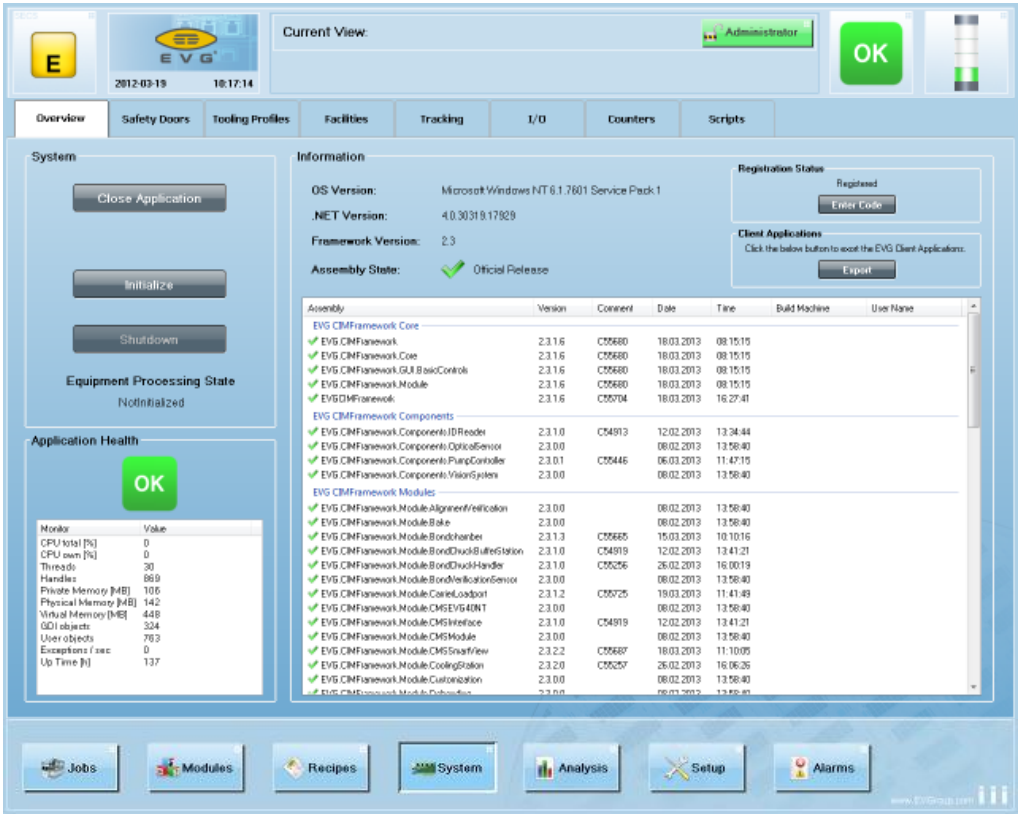

Figure 25 - System Window

The **System** window contains different sub windows that display basic system information and settings (e.g. Low I/O, Recipe Namespace Management…).

Note: Available system windows vary depending on access rights and system configuration.

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2.4.1 Overview

The **Overview** tab displays basic system information:

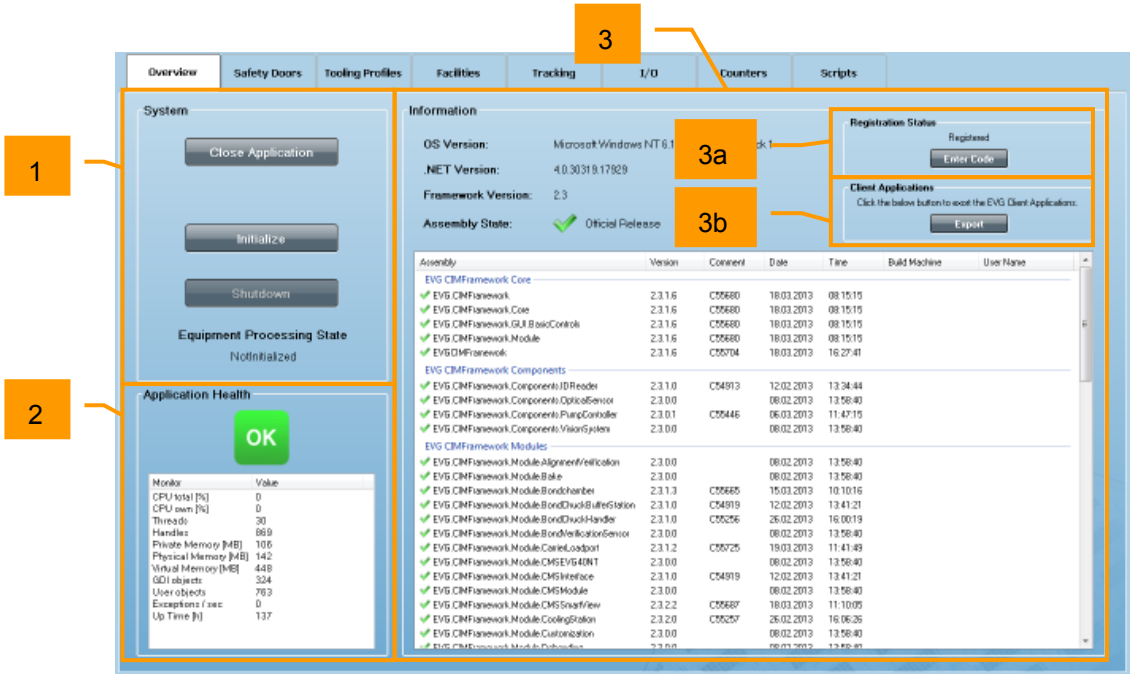

Figure 26 - System - Overview

1	System Frame
2	Application Health
3	Information Frame
3a	Registration Status
3b	Client Applications

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2.4.1.1 System Frame

The **System** frame is used to control the system state (close application, initialize or shutdown system).

It also displays the current **Equipment Processing State** (see chapter **1.3 Equipment Processing State** for further information).

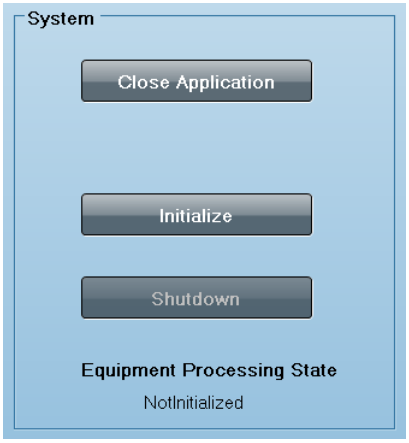

Figure 27 - System Frame

2.4.1.2 Application Health Frame

The **Application Health** frame displays information about computer performance (e.g. used CPU in %, threads, memory in MB…).

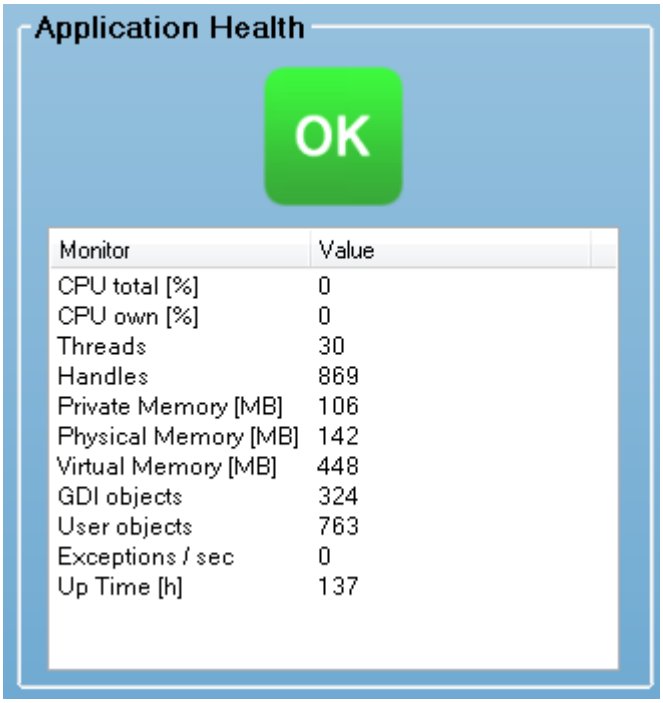

Figure 28 - Application Health Frame

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2.4.1.3 Information Frame

The **Information** frame displays version information (e.g. operating system, EVG CIMFramework, modules…).

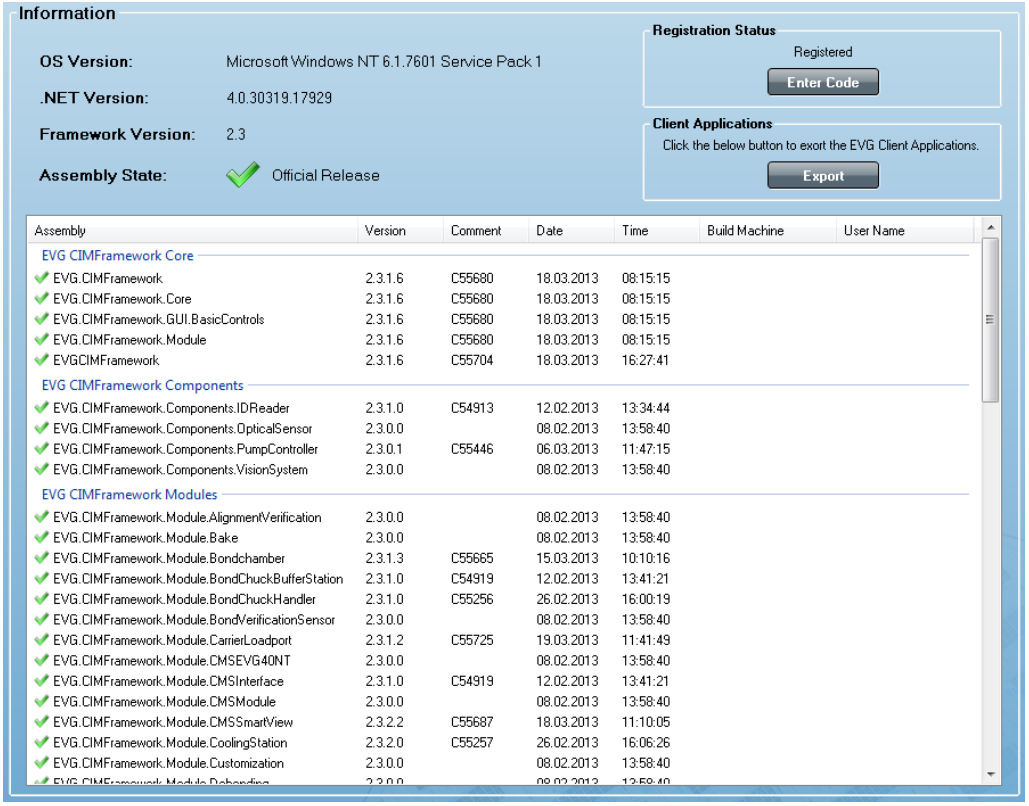

Figure 29 - Information Frame

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2.4.2 Safety Doors

Open the tab **Safety Doors** to find the current state and controls of safety doors and system interlocks.

The following example shows a system with an aligner and a bonder module. These modules can be controlled separately.

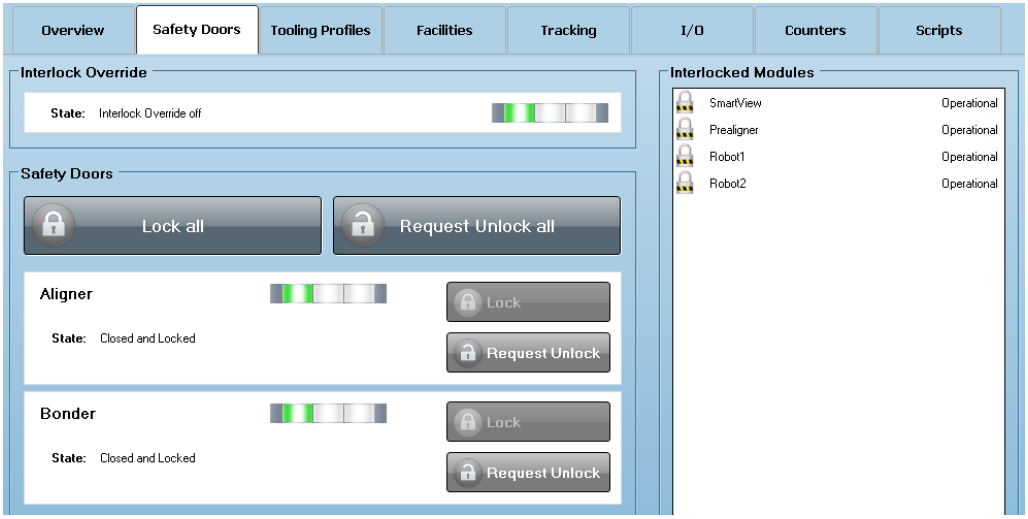
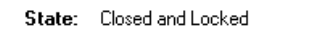


Figure 30 - Safety Doors

Current state of interlock override



Current state of the safety doors and interlocks of one module.

Lock the selected safety door(s).

Request unlock of the selected safety door(s).

Lock all safety doors of the system.

Request unlock of all safety doors of the system.

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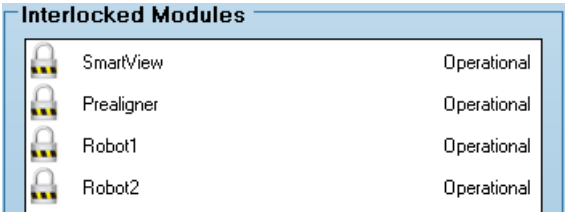
2.4.2.1 Interlocked Modules

The following area displays the current status of interlocked modules.



The following states can be displayed in this overview.

	Robot1	Operational	All doors are closed and locked.
	Robot1	Blocking	Module is not ready yet (disallows opening doors).
	Robot1	Paused	Module is ready (allows opening doors).

Refer to chapter 5 Safety Doors for information about how to operate the safety doors.

2.4.3 Tooling Profiles

Open the tab **Tooling Profiles** to switch between available tooling profiles.

Select a tooling profile from the list and click **Switch To Profile** to switch to it (only possible in maintenance mode).

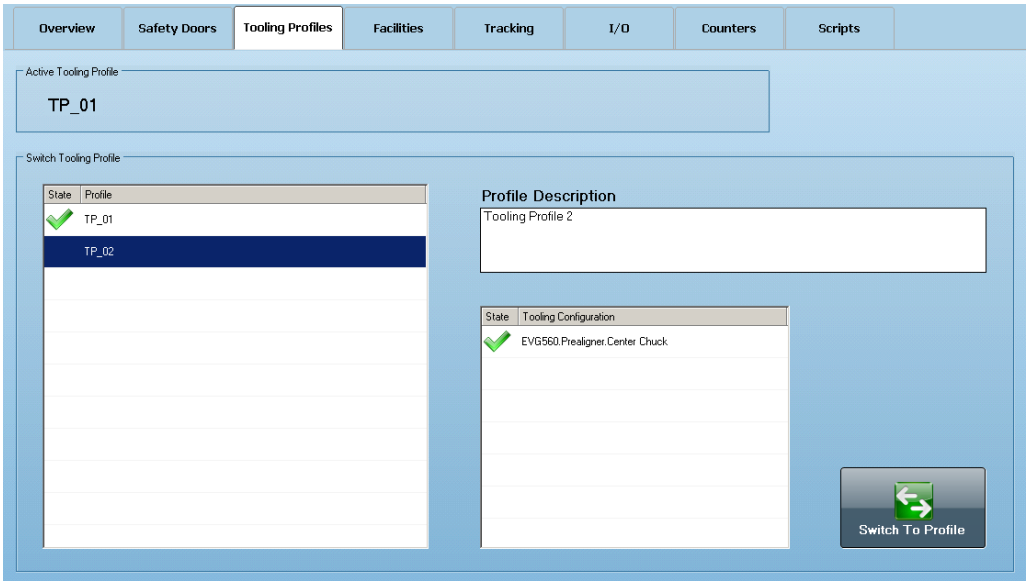


Figure 31 - Tooling Profiles

Tooling profiles can be set up in the tab **Tooling Profiles** in **Setup** (available depending on permission).

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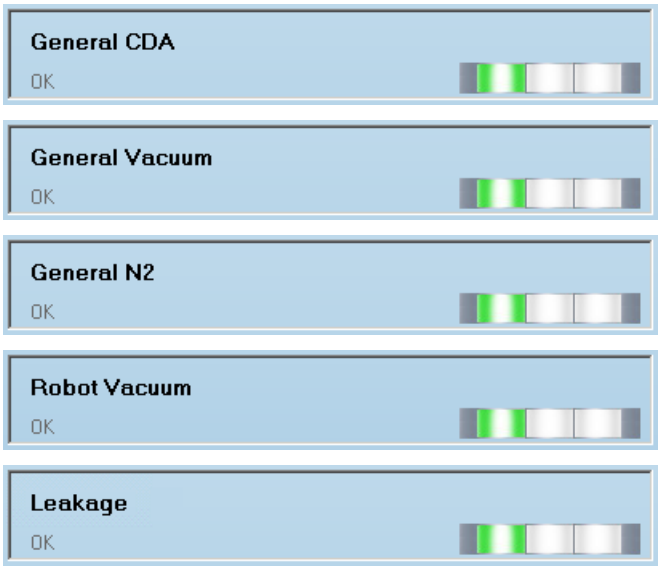
2.4.4 Facility Management

Open the tab **Facilities**.

The current state of facility items is displayed here (the displayed items vary depending on the system configuration).



In case of an error it will be indicated like in the following example:

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2.4.5 Tracking

Open the **Tracking** tab to find an overview of all materials that are currently on any station in the system.

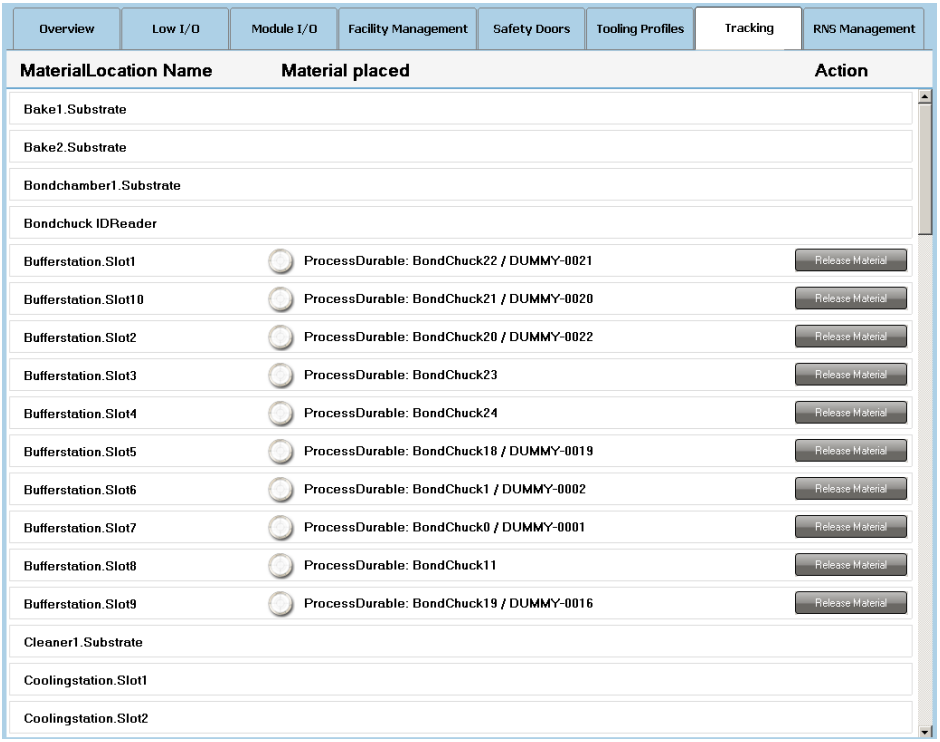


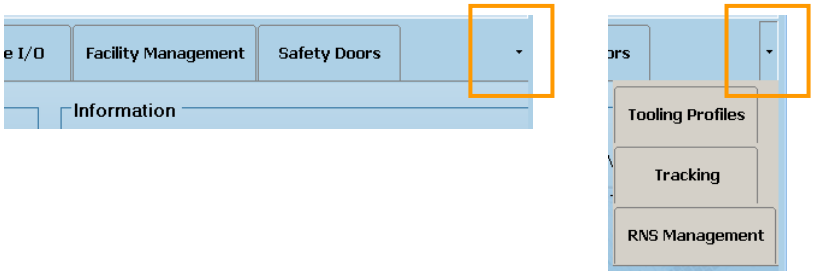
Figure 32 - Tracking

If the software indicates that there is a substrate on a module while there is no physical substrate on it (e.g. due to an error) the button

can be used to notify the software about it.

2.4.6 Additional System Tabs

Depending on the amount of modules, additional tabs can be opened by clicking on the arrow highlighted below:



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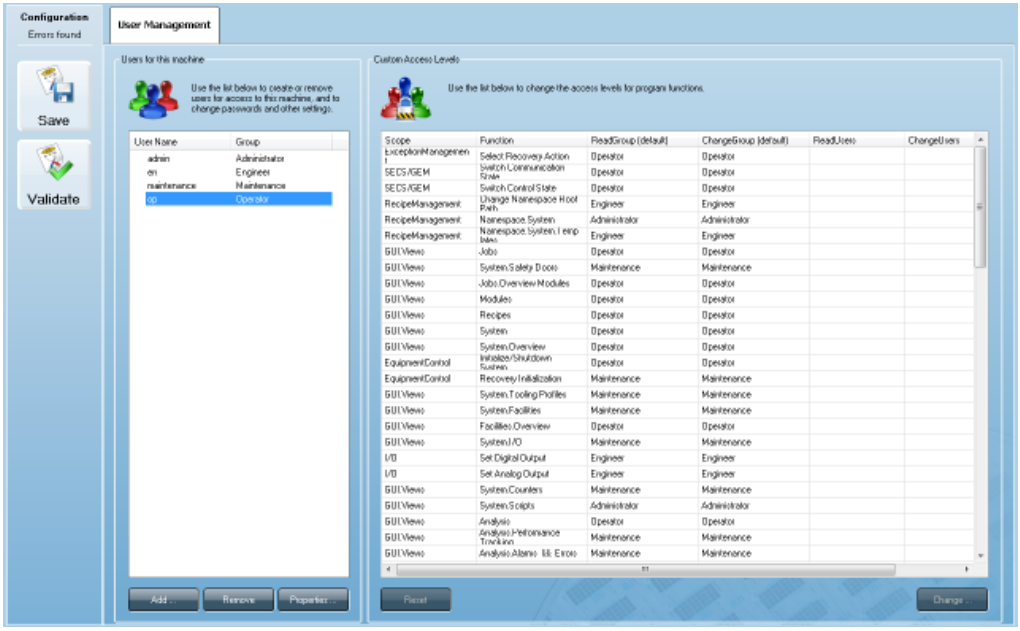
2.5 Setup

Click **Setup** in the bottom navigation bar:

The **User Management** will be opened.



2.5.1 Users for this machine

This area can be used to set up user accounts in general (add, remove, change).

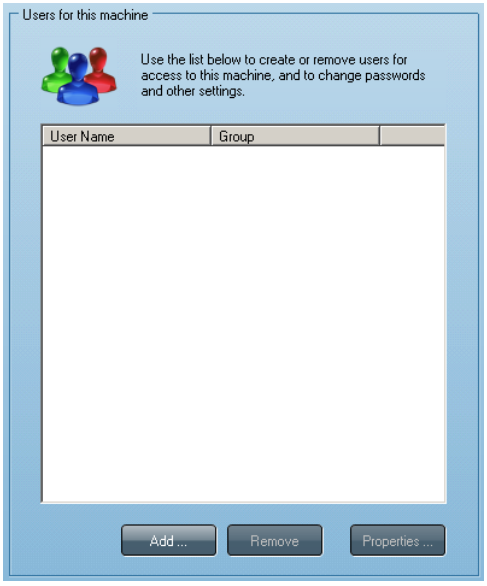

Users for this machine
Use the list below to create or remove users for access to this machine, and to change passwords and other settings.
User Name
Group
Add ...
Remove
Properties ...

Figure 33 - Users for this machine

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Add User

Click on Add ... to open the window “Add User”:

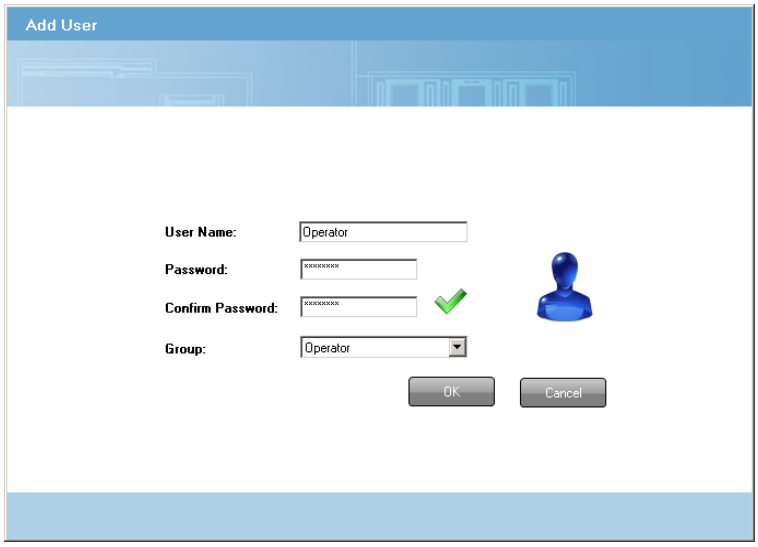

Figure 34 - Add User

Enter the user information and select a user group. The following groups are available:

- Operator: lowest access rights
- Maintenance: access rights for maintenance tasks
- Engineer: access rights for engineer tasks
- Administrator: highest access rights

After entering all user information, click OK to confirm.

Remove User

Select a user and click on Remove to permanently remove it.

Properties

Select a user and click on Properties ... to open the user properties in order to change the user name, password or user group.

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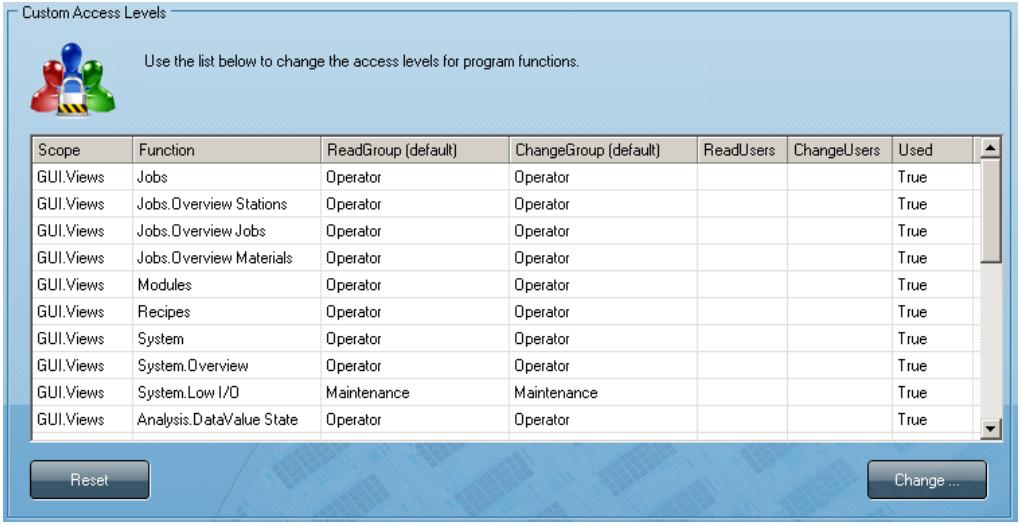
2.5.1.1 Custom Access Levels

Use the following list to change the access levels for specific program functions:

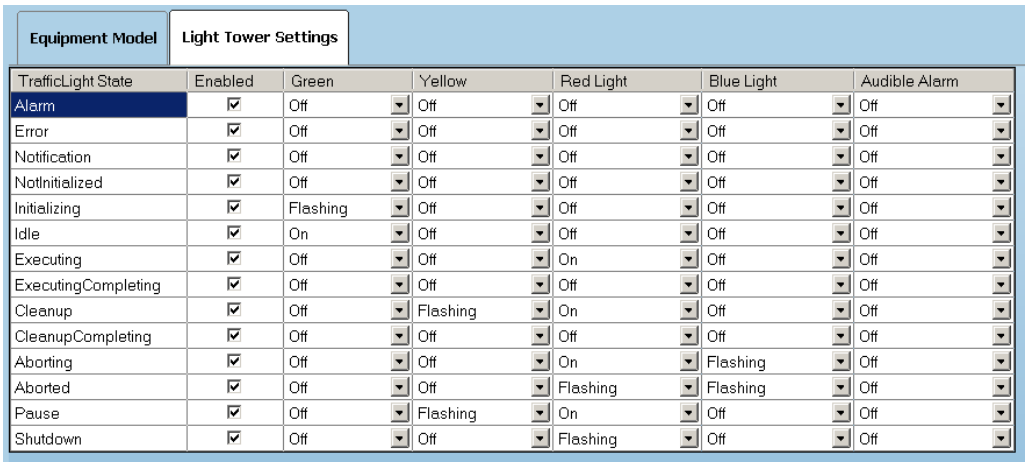


Scope	Function	ReadGroup (default)	ChangeGroup (default)	ReadUsers	ChangeUsers	Used
GUI.Views	Jobs	Operator	Operator			True
GUI.Views	Jobs.Overview Stations	Operator	Operator			True
GUI.Views	Jobs.Overview Jobs	Operator	Operator			True
GUI.Views	Jobs.Overview Materials	Operator	Operator			True
GUI.Views	Modules	Operator	Operator			True
GUI.Views	Recipes	Operator	Operator			True
GUI.Views	System	Operator	Operator			True
GUI.Views	System.Overview	Operator	Operator			True
GUI.Views	System.Low I/O	Maintenance	Maintenance			True
GUI.Views	Analysis.DataValue State	Operator	Operator			True

Figure 35 - Custom Access Levels

2.5.2 Light Tower Settings

Open **Light Tower Settings** tab to adjust how certain system states (e.g. error or alarm) should be indicated by the light tower:



TrafficLight State	Enabled	Green	Yellow	Red Light	Blue Light	Audible Alarm
Alarm	☑	Off	Off	Off	Off	Off
Error	☑	Off	Off	Off	Off	Off
Notification	☑	Off	Off	Off	Off	Off
NotInitialized	☑	Off	Off	Off	Off	Off
Initializing	☑	Flashing	Off	Off	Off	Off
Idle	☑	On	Off	Off	Off	Off
Executing	☑	Off	Off	On	Off	Off
ExecutingCompleting	☑	Off	Off	Off	Off	Off
Cleanup	☑	Off	Flashing	On	Off	Off
CleanupCompleting	☑	Off	Off	Off	Off	Off
Aborting	☑	Off	Off	On	Flashing	Off
Aborted	☑	Off	Off	Flashing	Flashing	Off
Pause	☑	Off	Flashing	On	Off	Off
Shutdown	☑	Off	Off	Flashing	Off	Off

Figure 36 - Light Tower Settings

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3 Jobs

3.1 Job Controls

Add a new job to queue.
After confirming by clicking **OK**, the job will be started immediately.

Stop current job.
Finishes process on all substrates which are currently in the system.

Abort current job.
Each module finishes its current process and stops afterwards. All used materials will stay in the current module.

Cleanup system (see chapter **3.2 Clean Up (optional)**)
Unloads all substrates into a cassette and all bond chucks onto the buffer station.

Unlock doors to open them (if equipped).

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3.2 Clean Up (optional)

If there is a substrate in any module, it is required to perform a cleanup.

If the system contains modules that cannot detect wafers (e.g. plasma chamber), the software will assume that there is a substrate in the module. This will set the **Equipment Processing State** to **Aborted**.

A cleanup is required to set the state to **Idle**. The cleanup can be initiated by going to **Jobs** and clicking the following button:

As soon as the state is **Idle**, the initializing process is finished and the software can be used to operate the system:

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3.3 Add Job

1) Click the following button in the bottom navigation bar to open the **Jobs** window:

2) Click **Add Job** to add a new job to the job queue:

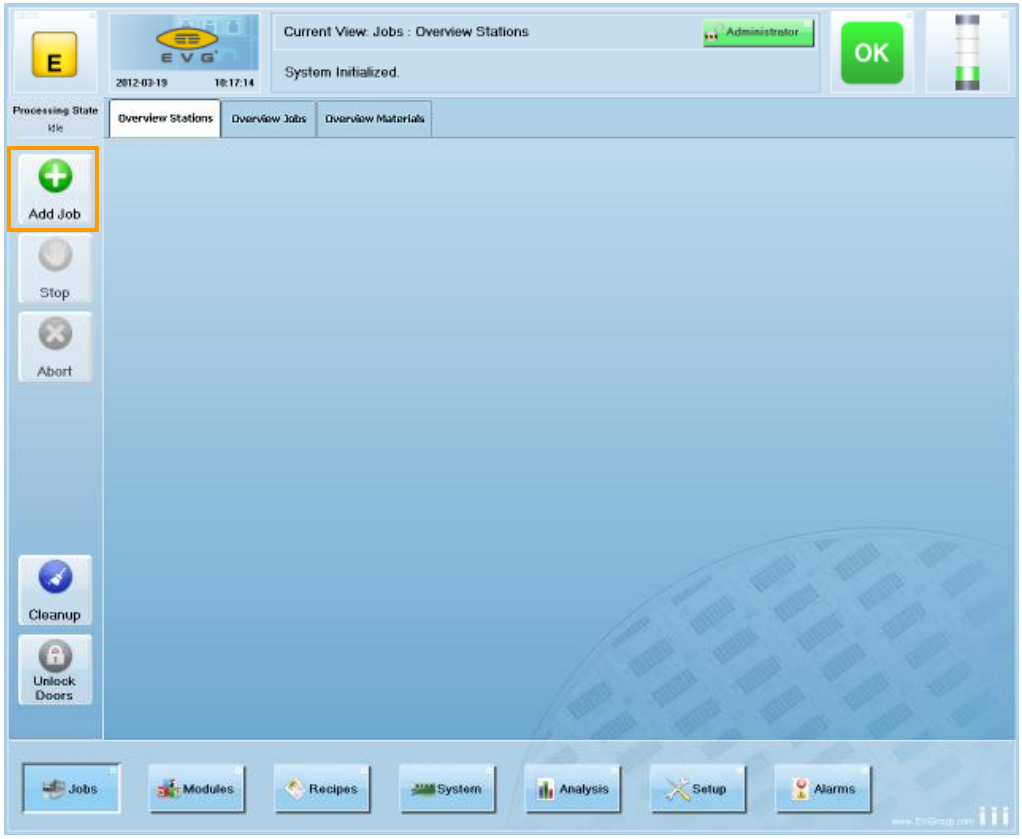

Figure 37 - Add Job

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3) The window **Add Job** appears. Select a namespace and recipe from the list and click **Next** to continue. If there is a recipe code associated with the recipe, a handheld ID reader can be used to select the recipe.

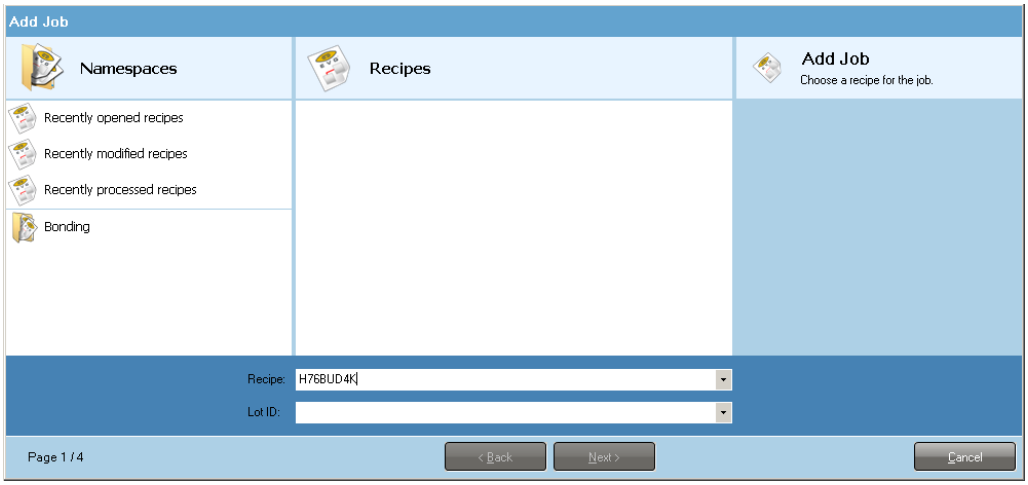
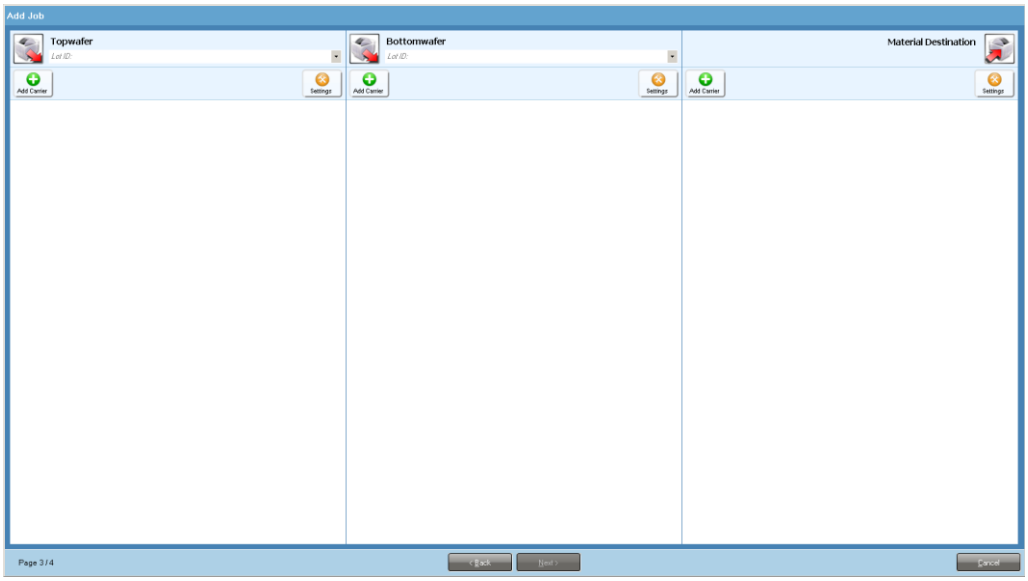
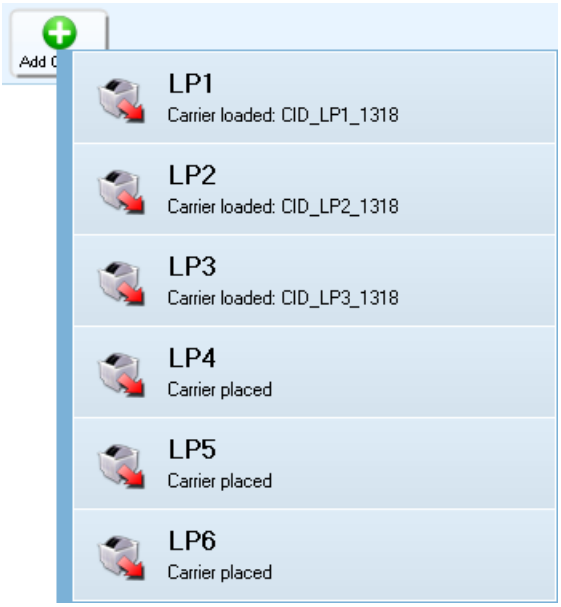


Figure 38 - Add Job Window

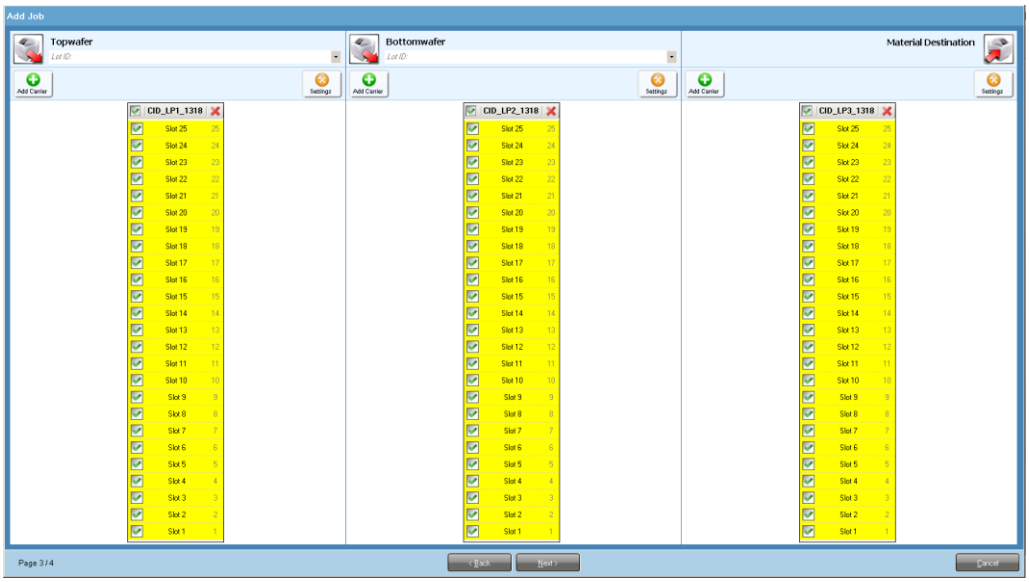
The options in the following windows vary depending on the system configuration. The material source and destination has to be defined (e.g. loadports).



4) Click **Add Carrier** to select a carrier for source and destination slots.



5) Select or deselect the source and destination slots for each carrier and click **Next** to continue.



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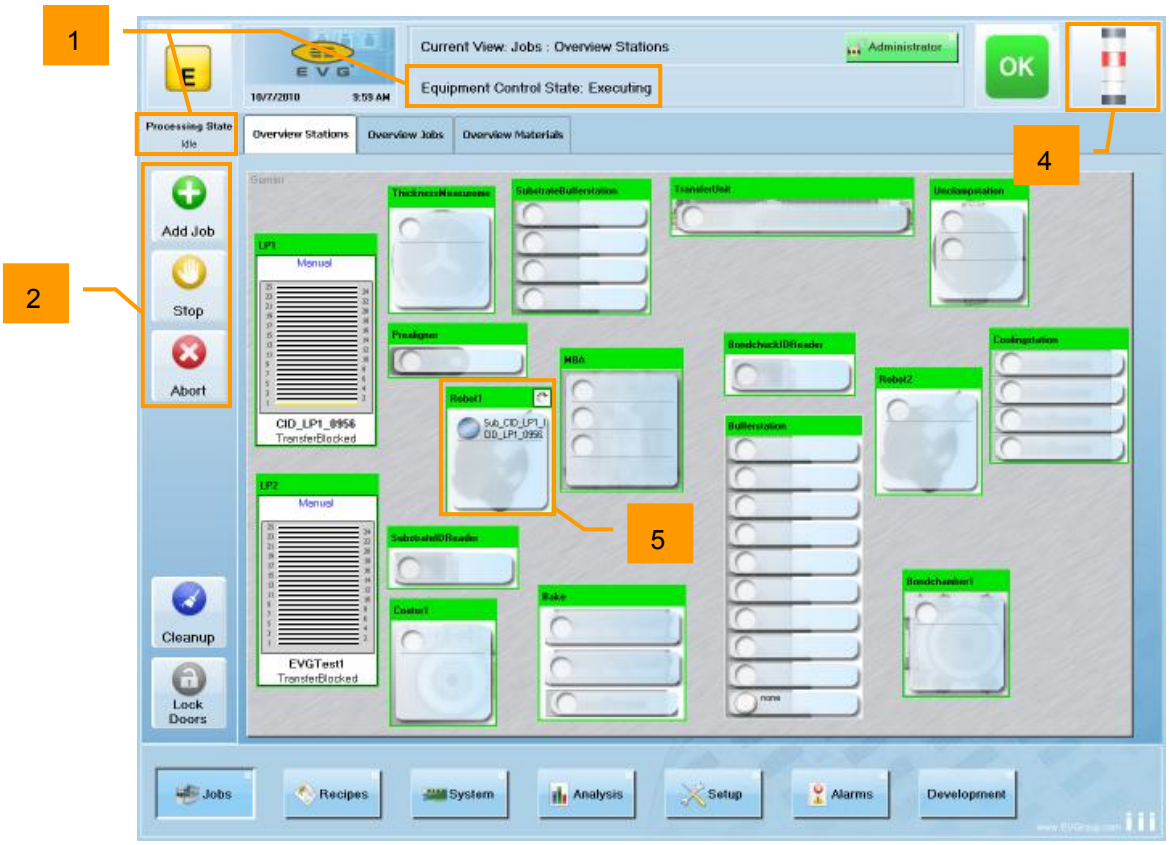
3.4 Execute Job

After executing the job the **Overview Stations** will change as described in the example below (modules depend on system configuration):



1	Equipment State	changed to **Executing**
2	Job Controls	**Stop** and **Abort** controls are available now
3	Light Tower	changes status while processing
4	Overview Stations	current location of substrate is always displayed here

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4 Recipe Programming

Click **Recipes** in the bottom navigation bar.

The **Recipes** window will be opened.

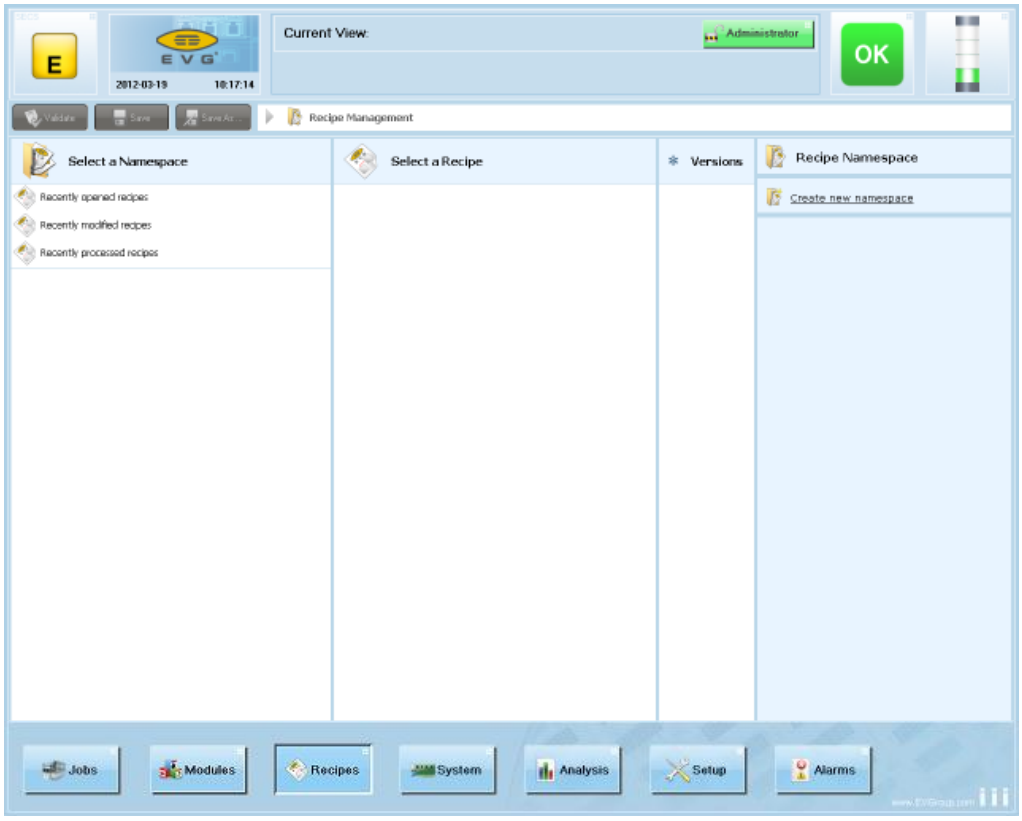

Figure 39 - Recipe Window

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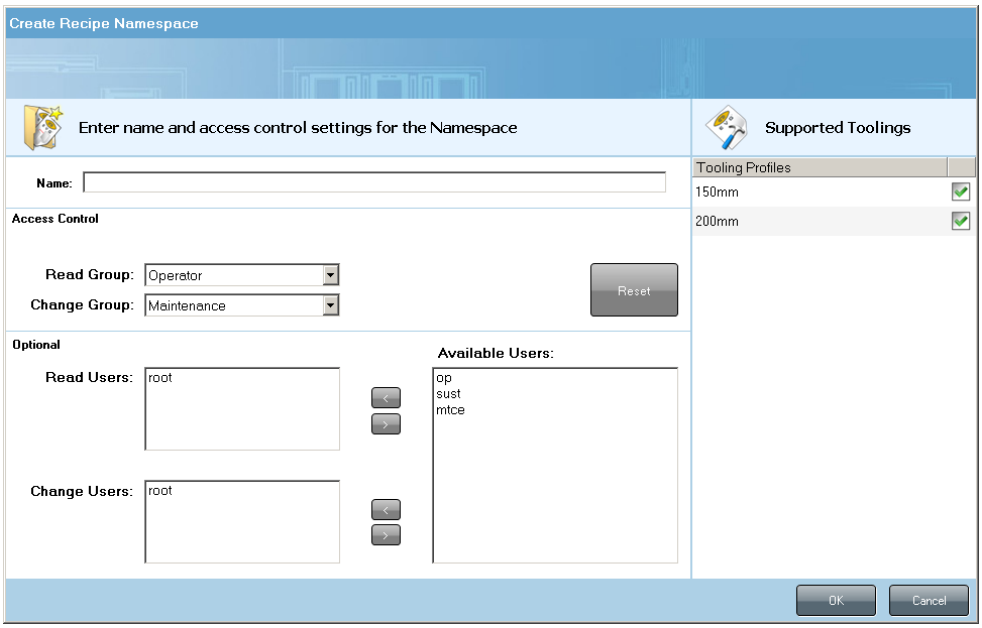
4.1 Recipe Namespace

Note: Every recipe has to be assigned to a “Recipe Namespace” (RNS). If none exists yet it has to be created first!

4.1.1 Create new Namespace

1) Click **Create new namespace**.
2) Enter all parameters and click **OK** to confirm.

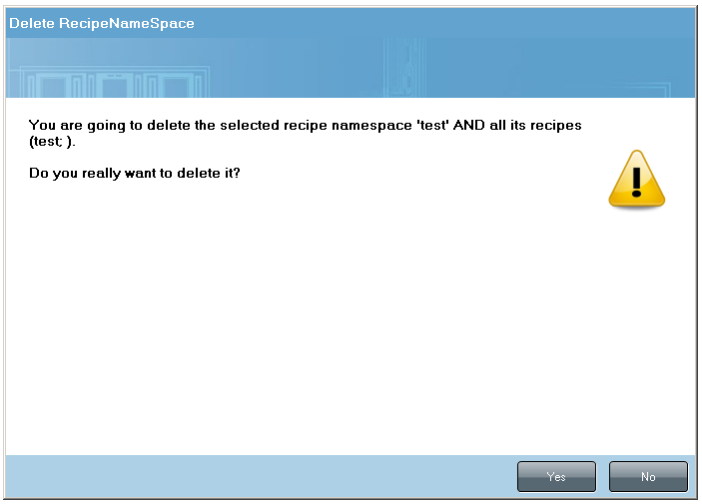


4.1.2 Modify Namespace

1) Select an existing namespace.
2) Click **Modify namespace**.
3) Enter all parameters and click **OK** to confirm.

4.1.3 Delete Namespace

1) Select an existing namespace.
2) Click **Delete namespace**.
3) Click **Yes** to confirm. Note that the namespace and all its recipes are deleted.


Delete RecipeNameSpace
You are going to delete the selected recipe namespace 'test' AND all its recipes (test;).
Do you really want to delete it?
Yes
No

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4.2 Recipe Overview

The **Recipe Overview** defines the flow of the substrate. It also describes on which stations and in which order the substrates are processed (see example below).

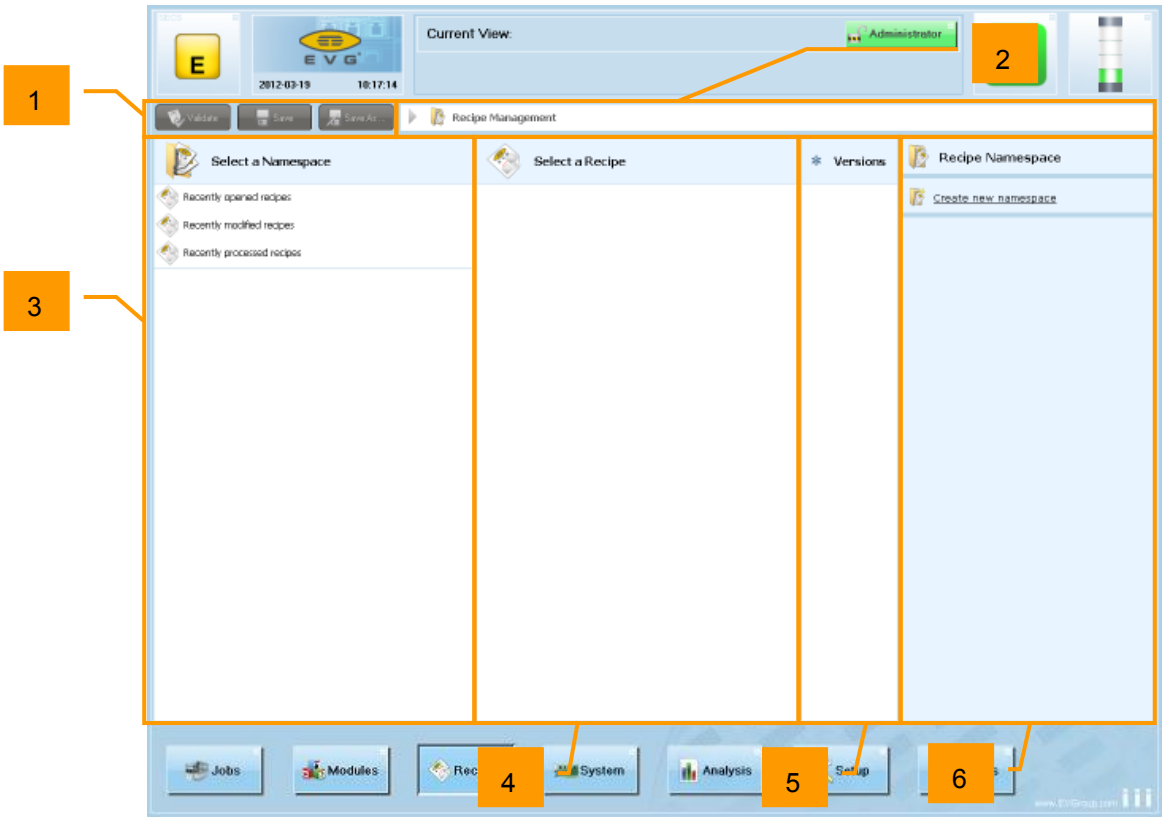

Figure 40 – Substrate Flow Editor

1	Recipe Control Buttons	Validate and Save buttons
2	Recipe Navigation Panel	navigate through the recipe structure
3	Select Namespace	select a namespace to find a list of its recipes
4	Select Recipe	select a recipe to find a list of its versions
5	Select Version	select a version of the recipe
6	Common Task View	displays further information and controls of the item selected (e.g. recipe namespace controls)

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4.2.1 Select Namespace

Click one of the recipe **Namespaces** on the left to select it.

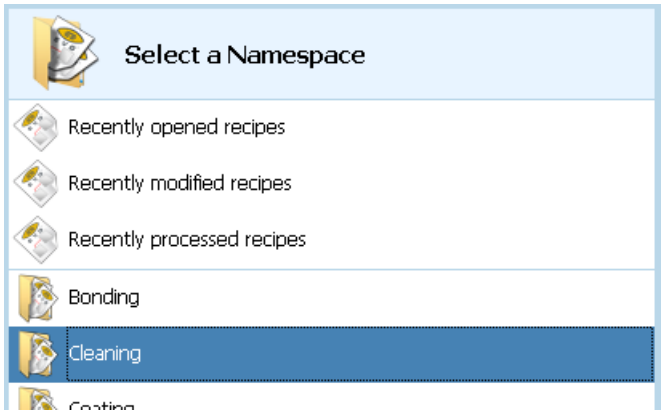

Figure 41 - Namespace Selection

The **Recipe Selection** area lists all recipes of the selected recipe namespace.

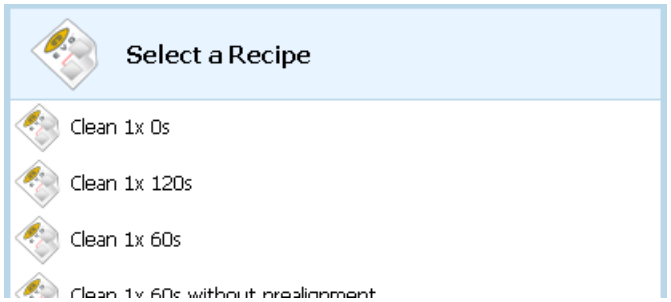

Figure 42 - Recipe Selection

The **Common Task View** displays all recipe namespace commands.

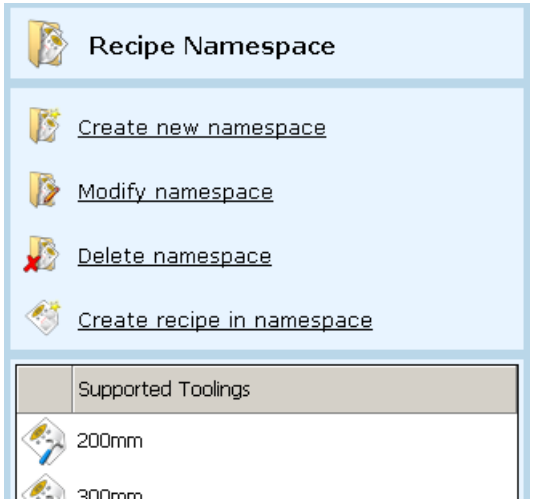

Figure 43 - Common Task View

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4.2.2 Select Single Recipe

Click one of the **Recipes** on the left to select it.

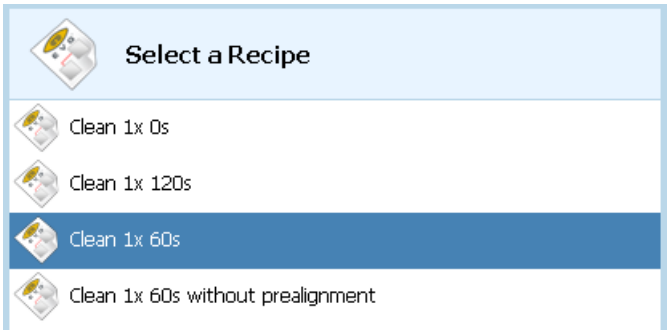

Figure 44 - Recipe Selection

The **Version Selection** area will list all versions of the selected recipes.

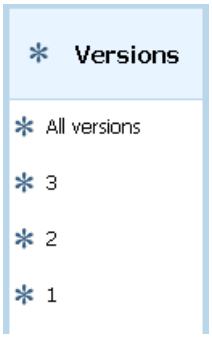

Figure 45 - Version Selection

The **Common Task View** will display recipe information and recipe commands (e.g. delete recipe).

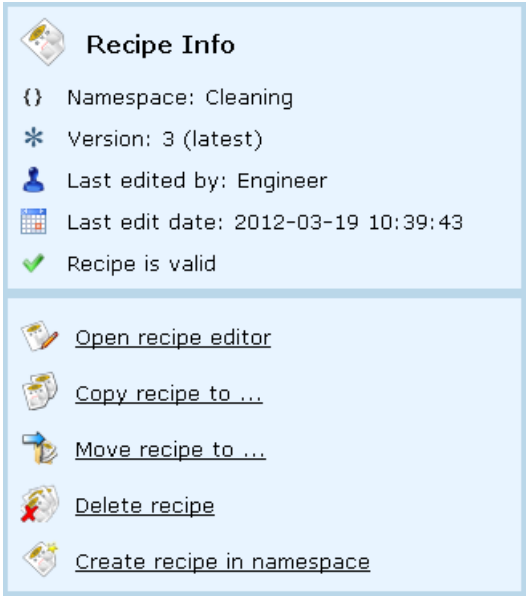

Figure 46 - Common Task View

4.2.3 Select Multiple Recipes

Click multiple **Recipes** while holding SHIFT key to select multiple recipes at once.

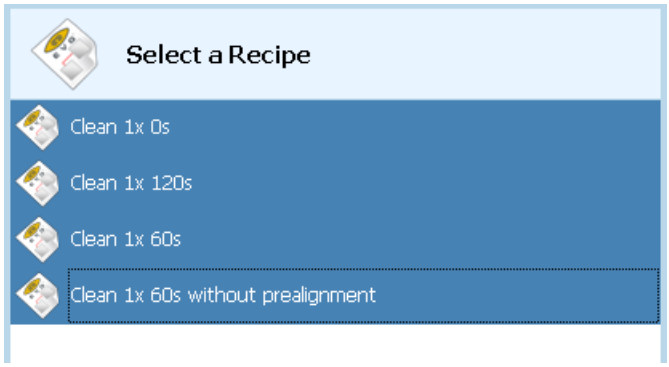

Figure 47 - Recipe Selection

The **Common Task View** will display recipe information and recipe commands for multiple recipes (e.g. delete all recipes selected).

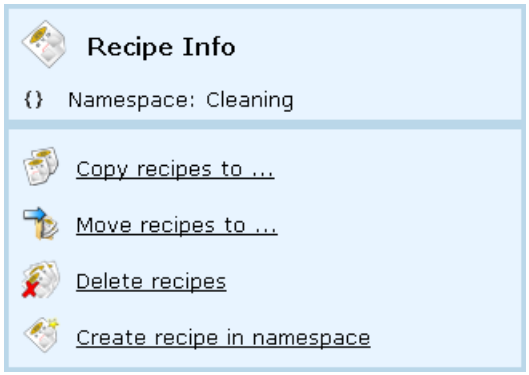

Figure 48 - Common Task View

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4.2.4 Select Version

Click one of the **Versions** to select it.

Figure 49 - Version Selection

The **Common Task View** will display version information and version commands (e.g. save version as…).

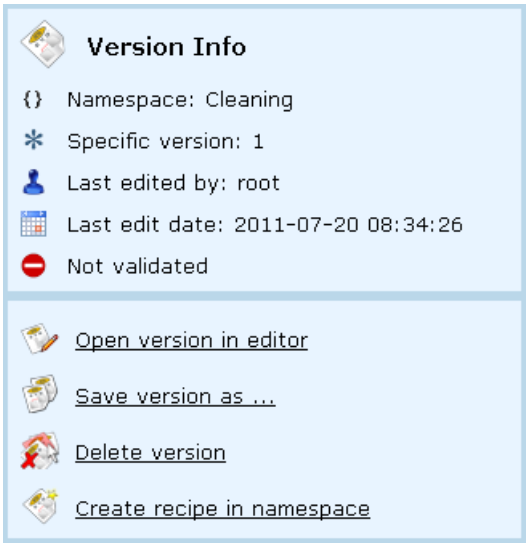

Figure 50 - Common Task View

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4.3 Create New Recipe

Select the namespace that the new recipe should be created in.

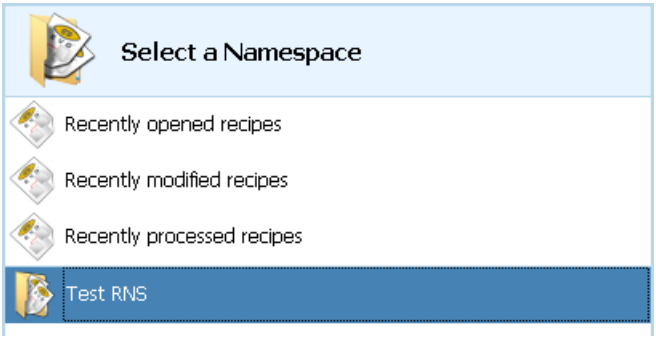

Figure 51 - Select namespace

Click **Create recipe in namespace**.

Figure 52 - Create recipe

Choose between flowable and linkable recipe and enter a recipe name and comment (optional). Click **OK** to confirm.

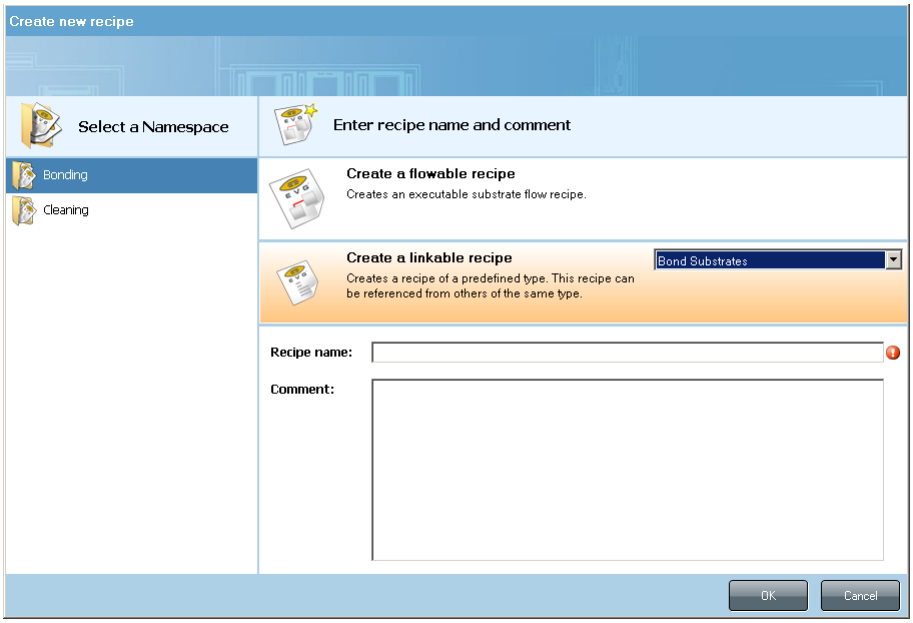

Figure 53 - Create New Recipe

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The **Recipes** window will open the recipe created. The window is divided into the following areas:

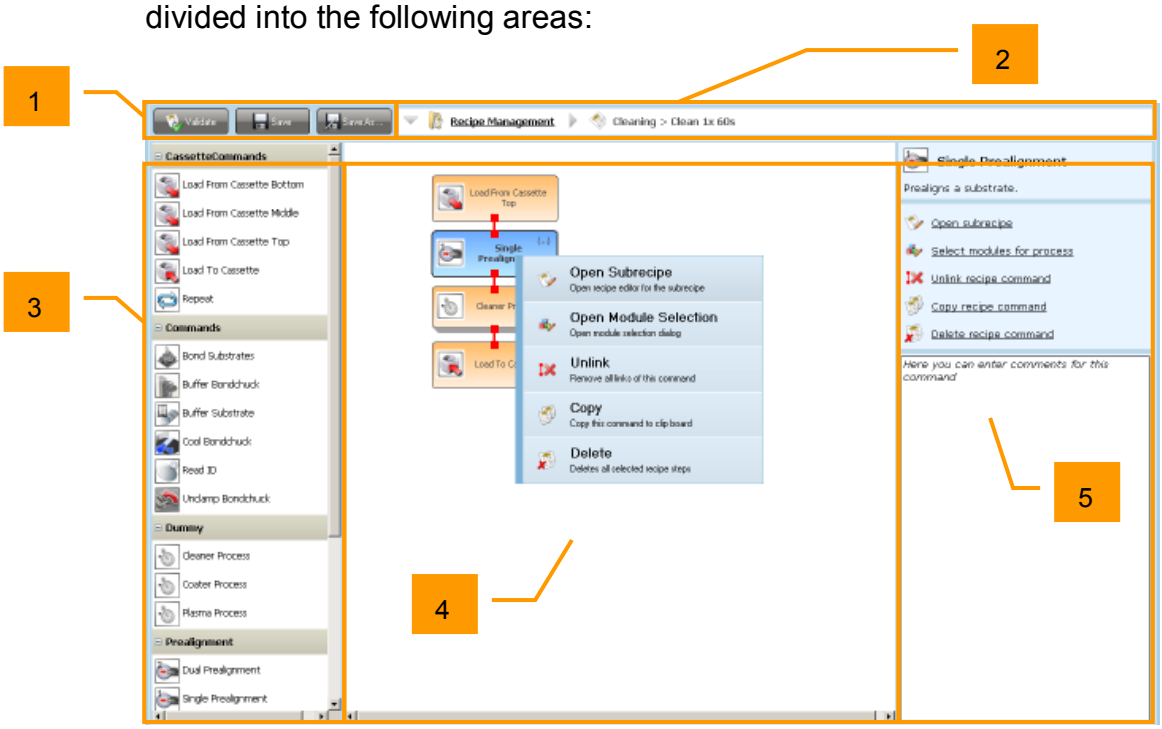


Figure 54 - Sample Recipe

1	Recipe Control Buttons	Validate and Save buttons
2	Recipe Navigation Panel	navigate through the recipe structure
3	Recipe Commands	lists all available steps for the recipe flow
4	Recipe Flow Diagram	displays flow of the recipe
5	Common Task View	displays further information about the recipe or a single recipe step (if selected)

4.3.1 Recipe Control Buttons

	Validate the recipe. Errors will be displayed on the bottom of the recipe window.
	Save the current recipe (new version of the same file).
	Save the current recipe as a new file.

4.3.2 Recipe Navigation Panel

Use the following panel to navigate in the entire recipe structure (from recipe management to single recipes and single recipe commands).

4.3.3 Recipe Commands

This list contains all recipe commands that can be used on the system.

Example:

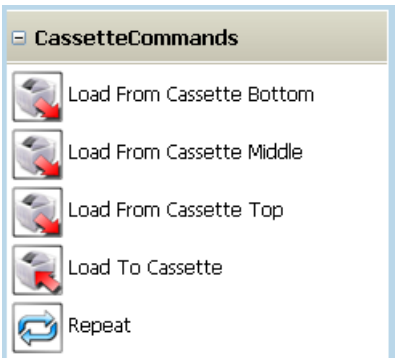
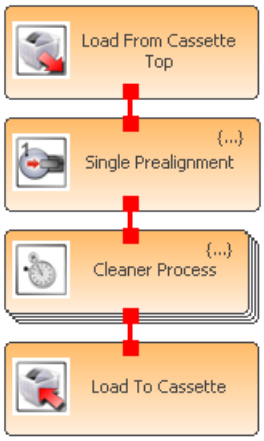


Figure 55 - Recipe Commands

Refer to module manuals to find detailed descriptions of all recipe commands.

4.3.4 Recipe Flow Diagram

The recipe flow can be set up in the recipe flow diagram.



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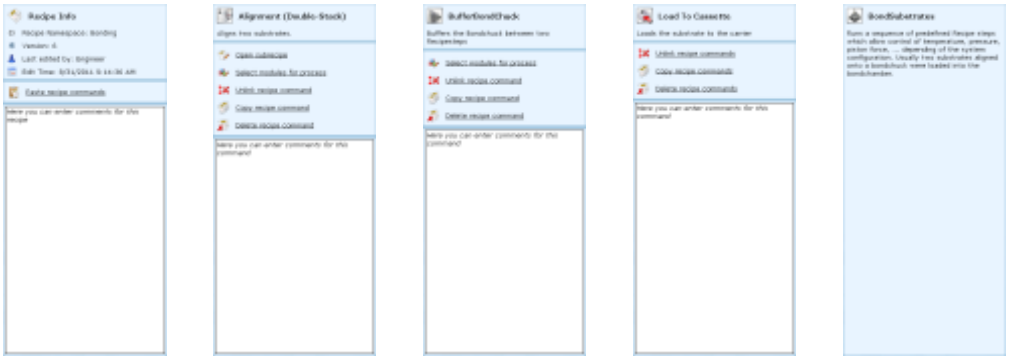
4.3.5 Common Task View

The **Common Task View** changes depending on the active selection in **Recipe Overview**. It displays information and/or actions for the selected item(s).



4.3.5.1 No Selection

If no recipe command is selected, the following information is displayed:

Figure 56 - Common Task View - No Selection

4.3.5.2 Recipe Command(s) Selected

If one or more recipe step is selected, certain menu items are displayed in the **Common Task View**. The available items depend on the recipe command(s) selected.

Example:

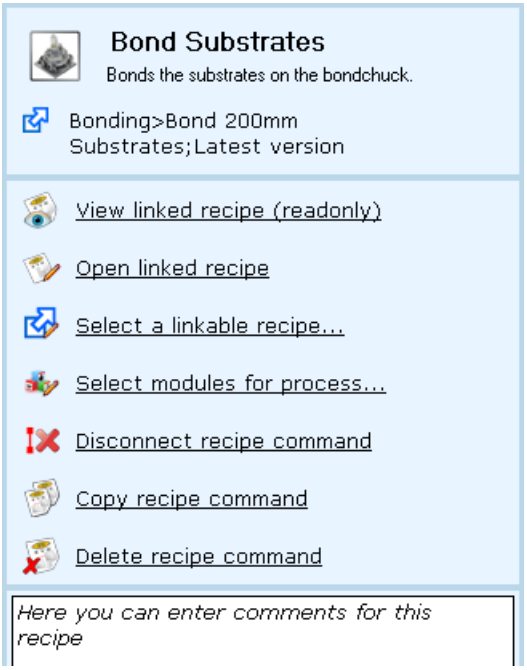

Bond Substrates
Bonds the substrates on the bondchuck.
Bonding>Bond 200mm Substrates;Latest version
View linked recipe (readonly)
Open linked recipe
Select a linkable recipe...
Select modules for process...
Disconnect recipe command
Copy recipe command
Delete recipe command
Here you can enter comments for this recipe

Figure 57 - Common Task View - Recipe Command(s) Selected

4.3.5.3 Recipe Flow Step Selected

If a recipe flow step is selected, a description is displayed in the **Common Task View**.

Example: BondSubstrates:

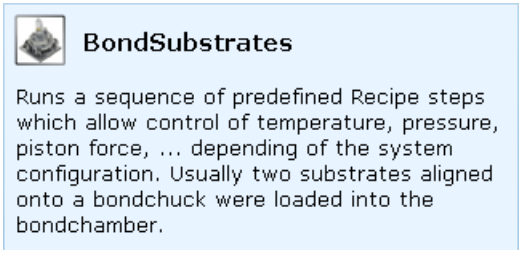

BondSubstrates
Runs a sequence of predefined Recipe steps which allow control of temperature, pressure, piston force, ... depending of the system configuration. Usually two substrates aligned onto a bondchuck were loaded into the bondchamber.

Figure 58 - Common Task View - Recipe Flow Step

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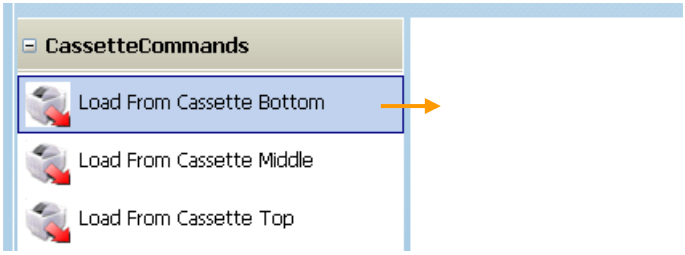
4.4 Edit Recipe

4.4.1 Create Recipe Command

Drag and drop a recipe command from the left onto the blank field on the right to create a recipe command:



A recipe command without any connection will be created:

4.4.2 Select Recipe Command

Click a recipe command to select it. The color will change to blue (see below).

Not selected:

Selected:

To select multiple recipe commands at once, hold CTRL or SHIFT key while selecting recipe steps or drag-and-drop the mouse cursor to select all recipe commands below the rectangle formed (see below).

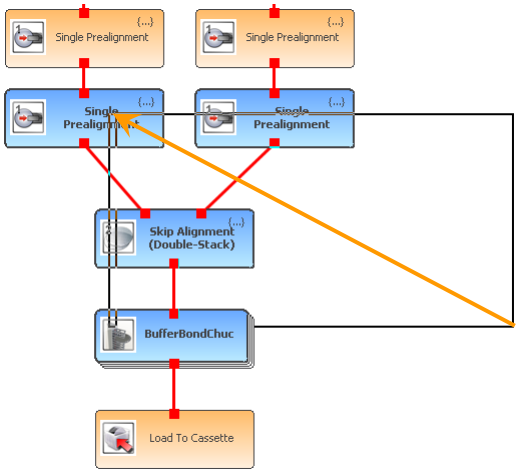


Figure 59 - Select multiple recipe commands

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4.4.3 Recipe Command Menu

After selecting a recipe command, settings will appear to the right (available options vary depending on recipe step). Refer to the following chapters for further information.

4.4.3.1 Open Subrecipe

Click Open subrecipe or right-click the recipe step and select **Open Subrecipe** to open settings of the recipe command (if available).

Example:

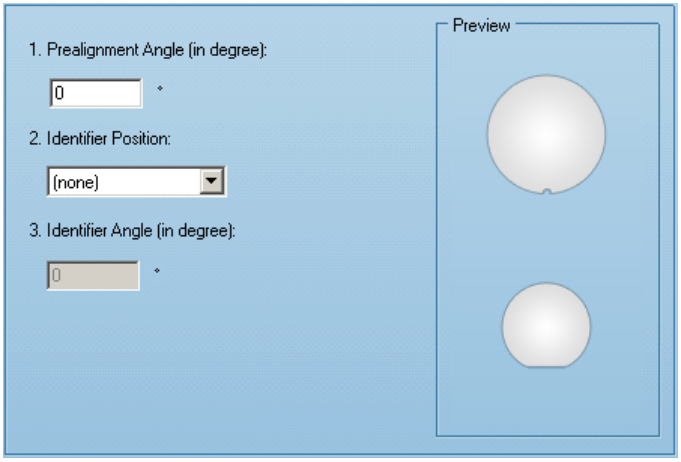

Figure 60 - Single Prealignment Recipe

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4.4.3.2 Select Modules for Process

Click Select modules for process or right-click the recipe step and select **Open Module Selection** to open settings for the links of the recipe command.

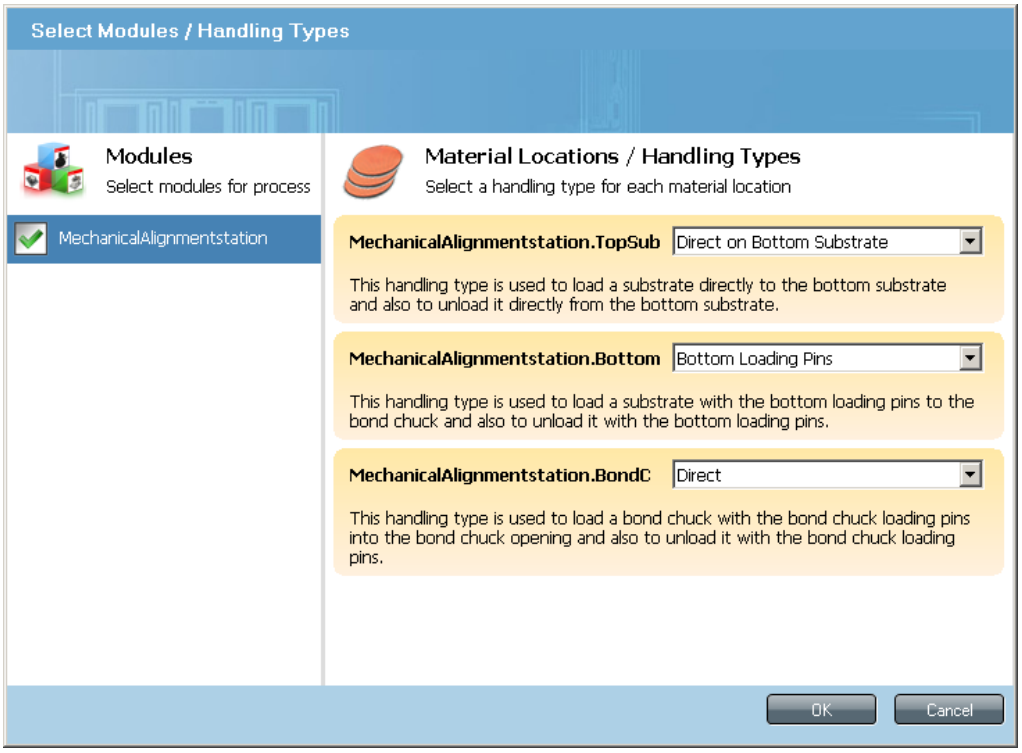
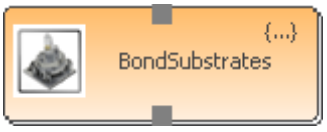

Select Modules / Handling Types
Modules
Select modules for process
MechanicalAlignmentstation
Material Locations / Handling Types
Select a handling type for each material location
MechanicalAlignmentstation.TopSub
Direct on Bottom Substrate
This handling type is used to load a substrate directly to the bottom substrate and also to unload it directly from the bottom substrate.
MechanicalAlignmentstation.Bottom
Bottom Loading Pins
This handling type is used to load a substrate with the bottom loading pins to the bond chuck and also to unload it with the bottom loading pins.
MechanicalAlignmentstation.BondC
Direct
This handling type is used to load a bond chuck with the bond chuck loading pins into the bond chuck opening and also to unload it with the bond chuck loading pins.
OK
Cancel

Figure 61 - Select Modules for Process

Select the modules that should be used for processing the recipe command and select a handling type for each material location.

The layers of each recipe command indicate the number of available modules (up to four are displayed):

2 bond modules:



4 cooling chucks:

10 buffer station slots:

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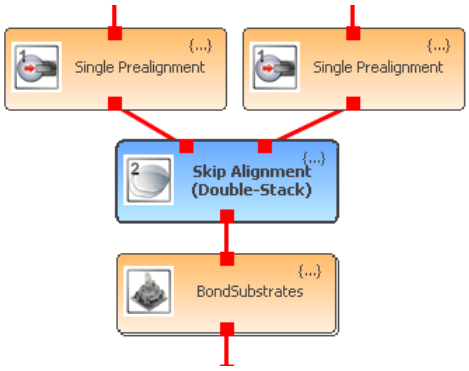
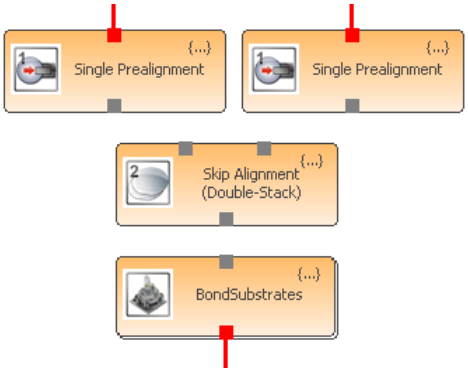
4.4.3.3 Disconnect Recipe Command

Either click **Disconnect recipe command** or right-click a recipe command and select **Disconnect** to remove all connections to the recipe command.

Linked:



Unlinked:



4.4.3.4 Copy Recipe Command

Either click Copy recipe command or right-click a recipe command and select **Copy** to copy the selected recipe command(s) to the clipboard.

4.4.3.5 Delete Recipe Command

Either click Delete recipe command or right-click a recipe command and select **Delete** to copy the selected recipe command(s).

4.4.3.6 Paste Recipe Command

Click on a blank area in the Recipe Overview to deselect all recipe commands. The toolbox on the right will change to the following:

Either click Paste recipe commands or right-click on a blank area in the Recipe Overview and select Paste to paste recipe command(s) from the clipboard.

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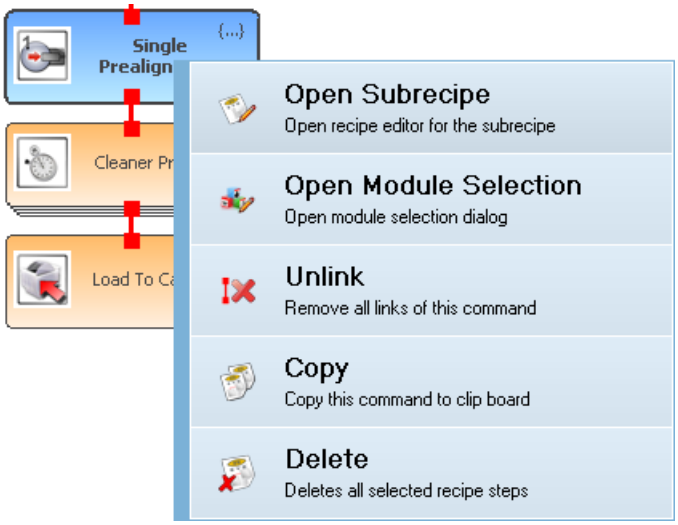
4.4.4 Context Menu

Right-click a recipe command or any blank area in the recipe window to open the context menu.



Open Subrecipe	Open the subrecipe editor of the recipe step (see chapter 4.4.3.1 Open Subrecipe).
Open Module Selection	Select which modules should be used for processing (see chapter 4.4.3.2 Select Modules for Process).
Unlink	Remove all links of the recipe command (see chapter 4.4.6.1 Unlink Recipe Steps).
Delete	Delete the selected recipe step(s) (see chapter 4.4.3.5 Delete Recipe Command).
Copy	Copy selected recipe command(s) to clipboard.
Paste	Paste recipe command(s) from clipboard.
Select all	Select all recipe commands in recipe overview.

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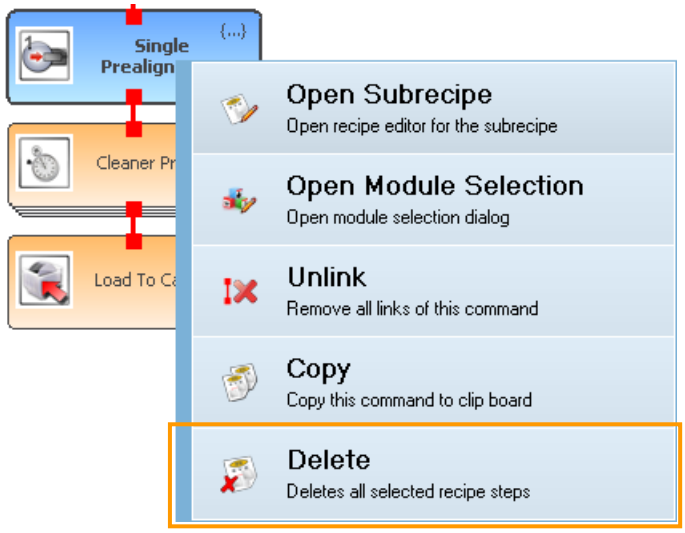
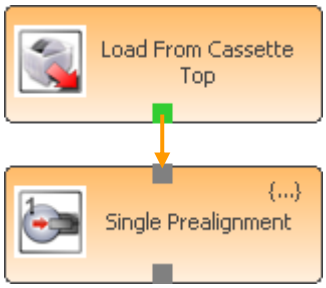
4.4.5 Delete Recipe Command

Select a recipe step or multiple recipe steps (using CTRL or SHIFT key), press **Delete** key on keyboard or right-click and select **Delete** from the context menu.



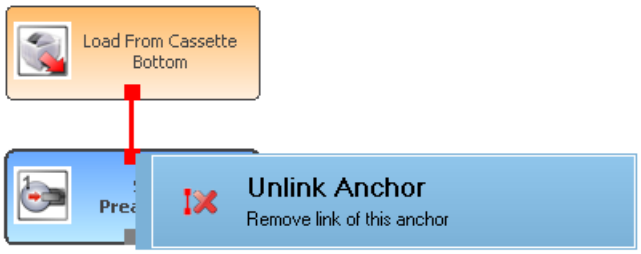
4.4.6 Link Recipe Commands

Drag and drop from a connecting point of one recipe command to the connecting point of another recipe command to create a link.



4.4.6.1 Unlink Recipe Steps

Right-click a connecting point of a linked recipe command and click **Unlink** to remove the link or right-click a recipe command to remove all links from and to the recipe command.



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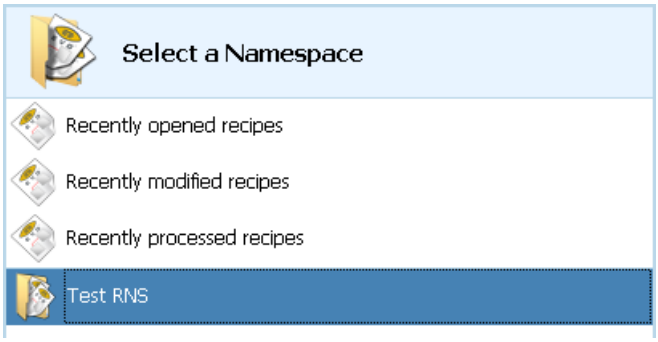
4.5 Open Recipe

Browsing and opening recipes can be done in the recipe overview window. If not currently open, it can be accessed by clicking **Recipe Management** in the navigation bar.

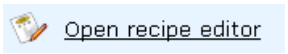
Select a **Namespace** from the list or use one of the functions above to display recently opened, modified or processes recipes.



Select a **Recipe** by selecting it from the list of available recipes.

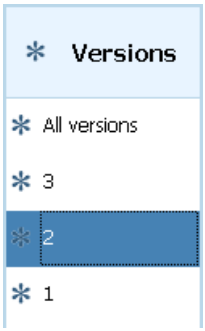
Open latest version:

Click **Open recipe editor** to automatically open the latest version of the selected recipe.



Open specific version:

Select a **Version** from the list and click **Open version in editor** to open that specific version.



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4.6 Save Recipe

The button

can be used to save changes made to a recipe. A new version will be added to the current recipe file and all previous versions can still be accessed afterwards if needed.

To save the current recipe as a new recipe file, click

.

In the following window select a **Recipe Namespace** and enter a **Recipe Name** and **Comment** (optional). Click **OK** to confirm.

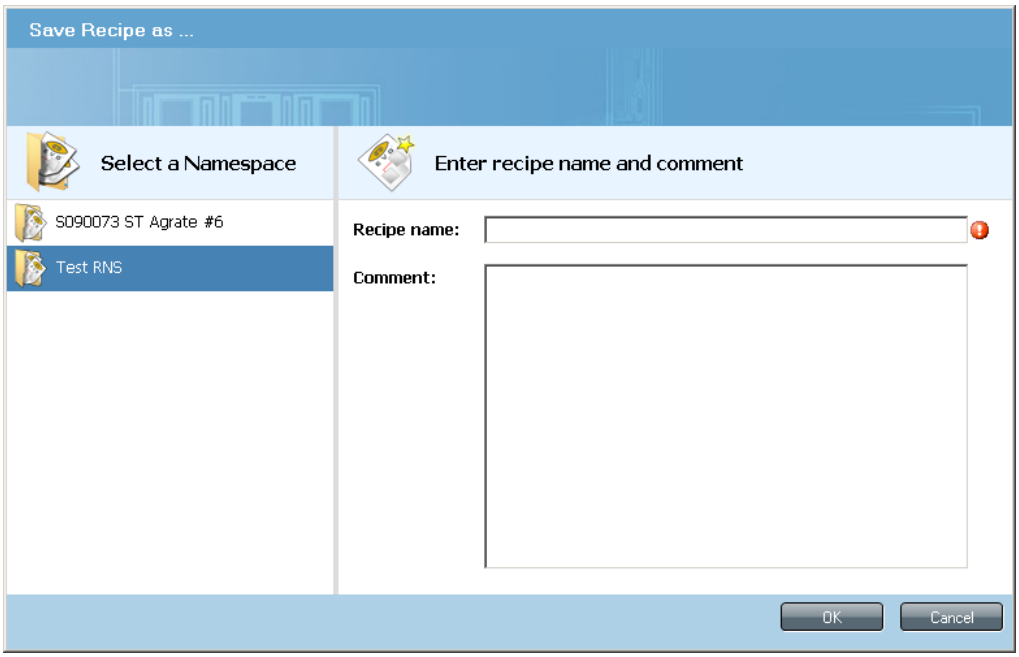

Figure 62 - Save Recipe as...

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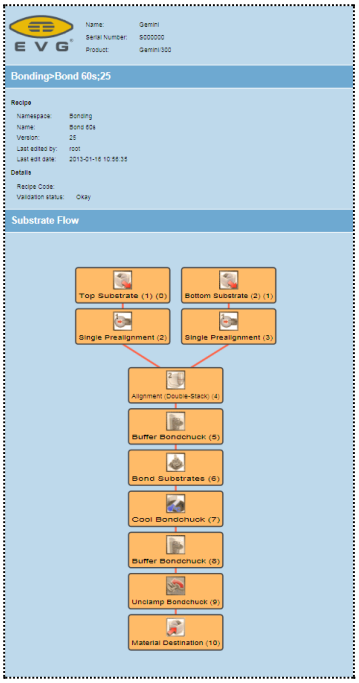
4.7 Export Recipe

1) Select the recipe that has to be exported.

2) Click **Export to human readable file…**

3) Open the exported file (a web browser that supports SVG files is required).

The exported file includes meta information (e.g. recipe name, version), substrate flows and parameters/settings of the module recipes.



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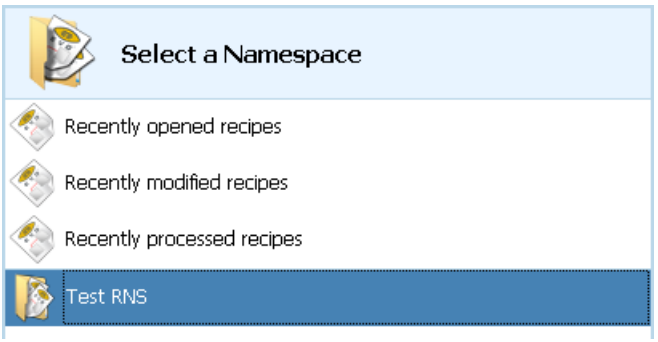
4.8 Delete Recipe

In the recipe overview window, select the **Namespace** that contains the recipe that should be deleted.



Select the **Recipe** that should be deleted.

Click **Delete recipe** or select a version and click **Delete version** to delete the recipe or only the selected version of the recipe.

The following dialog box will appear prompting to confirm deleting the recipe or specific version of the recipe.

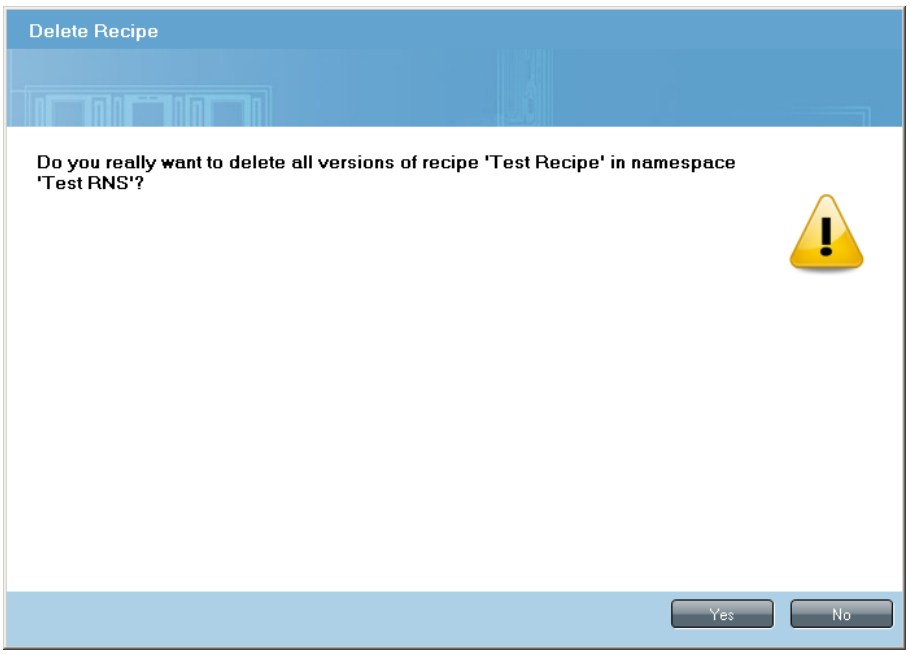


Figure 63 - Delete Recipe

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4.9 Recipe Validation

4.9.1 Static Recipe Validation

A recipe can be validated for issues on opening and saving.

It has to be validated when adding a job (a job cannot be started if there is an issue with the recipe).

The last known validation result is shown in the details section of the common task view.

The recipe can also be validated by clicking the **Validate** button in the recipe controls at any time.

A list of information, warnings or errors (if any) will be listed at the bottom of the recipe window.

Example:

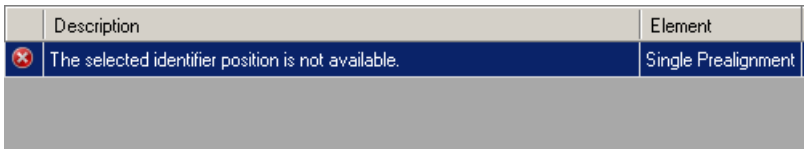

Figure 64 - Recipe Validation Error

The recipe command where issues were detected will be marked with the corresponding icon in the recipe flow diagram.

Example:

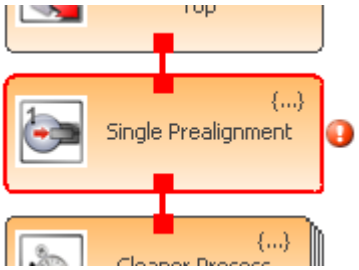

Figure 65 - Error Icon

4.9.2 Dynamic Recipe Validation

In addition to the static recipe validation, the dynamic recipe validation checks the recipe for additional issues when a job is started.

If there is an error, the job is canceled.

If there is a warning, the user has to decide if the job should be canceled.

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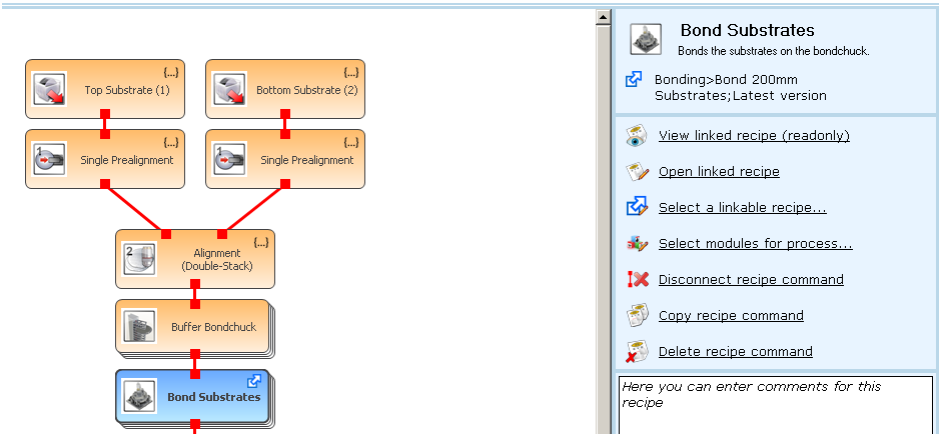
4.10 Recipe Linking

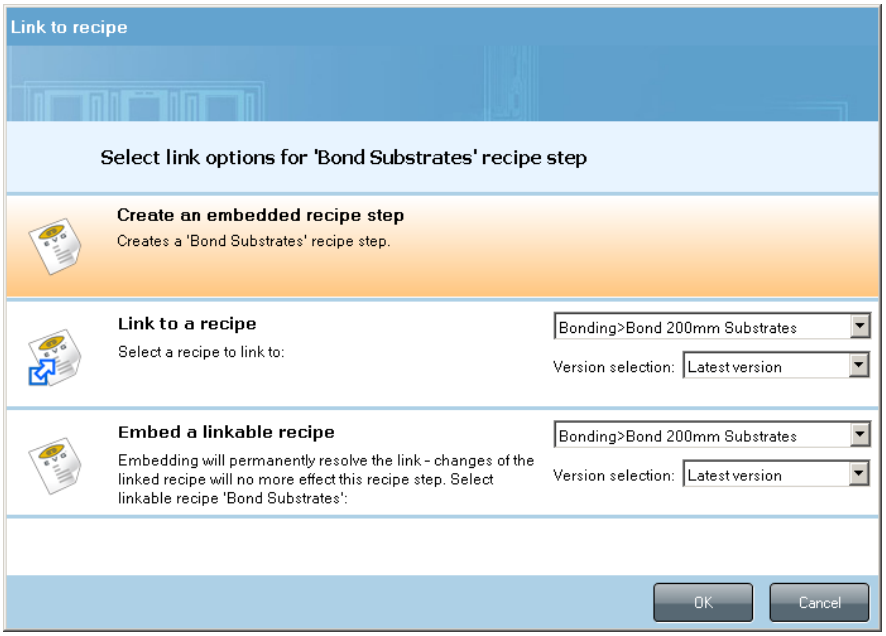
Linkable recipes define a process on a module. In the following example an existing module recipe for the bond module is linked as a reference. Changes made to the “Bond Substrates” recipe affect all recipes where it is linked.

The blue icon indicates if the recipe step is embedded or linked.



4.10.1 Link Embedded Recipe

When creating a linkable recipe command, the following options are available.


Link to recipe
Select link options for 'Bond Substrates' recipe step
Create an embedded recipe step
Creates a 'Bond Substrates' recipe step.
Link to a recipe
Select a recipe to link to:
Bonding>Bond 200mm Substrates
Version selection:
Latest version
Embed a linkable recipe
Embedding will permanently resolve the link - changes of the linked recipe will no more effect this recipe step. Select linkable recipe 'Bond Substrates':
Bonding>Bond 200mm Substrates
Version selection:
Latest version
OK
Cancel

- Embedded recipe step: recipe step is stored as part of the flow recipe (traditional way)
- Link to a recipe: links to an existing recipe
- Embed a linkable recipe: the linkable recipe is embedded in the recipe

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4.11 Recipe Code

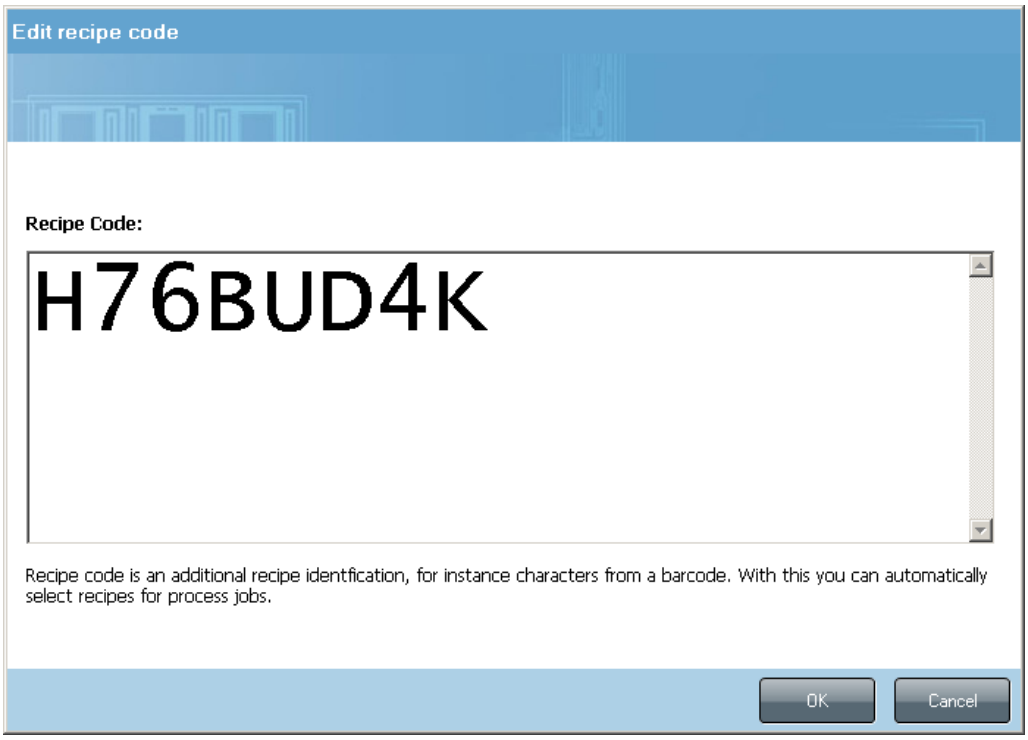
A recipe code identifies a recipe with a specific ID. The recipe code is associated with the recipe.

4.11.1 Edit Recipe Code

1) Open the recipe that should be edited.

2) Click on a blank space of the recipe editor to display the common task view of the entire recipe (recipe parameters and commands). Click **Set recipe code…**

3) Enter a recipe code and click **OK** to confirm.


Edit recipe code
Recipe Code:
H76BUD4K
Recipe code is an additional recipe identfication, for instance characters from a barcode. With this you can automatically select recipes for process jobs.
OK
Cancel

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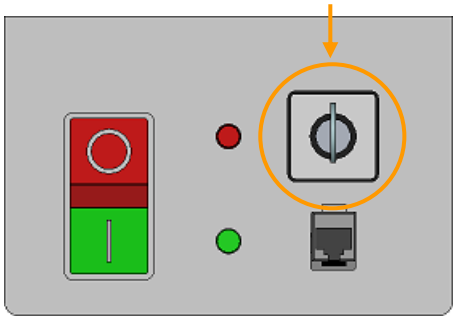
5 Safety Doors

5.1 Activate Interlock Override

The interlock override key is located next to the main switch.



After activating interlock override, it will be highlighted in the software.

When the safety interlock override is activated, the following actions cannot be performed:

- Initialize the system
- Start a process (a running process will continue)
- Lock or unlock the safety doors

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5.2 Open Safety Doors

After initializing the system, a **Request Unlock** can be sent to unlock the safety doors for maintenance work. The interlocked modules (e.g. robot) will be paused.

Go to **System** and open **Safety Doors**.

Note: By default, maintenance user level is required to be able to open the safety door window.

The following window will be displayed where the current state is displayed and safety doors can be locked and unlocked.

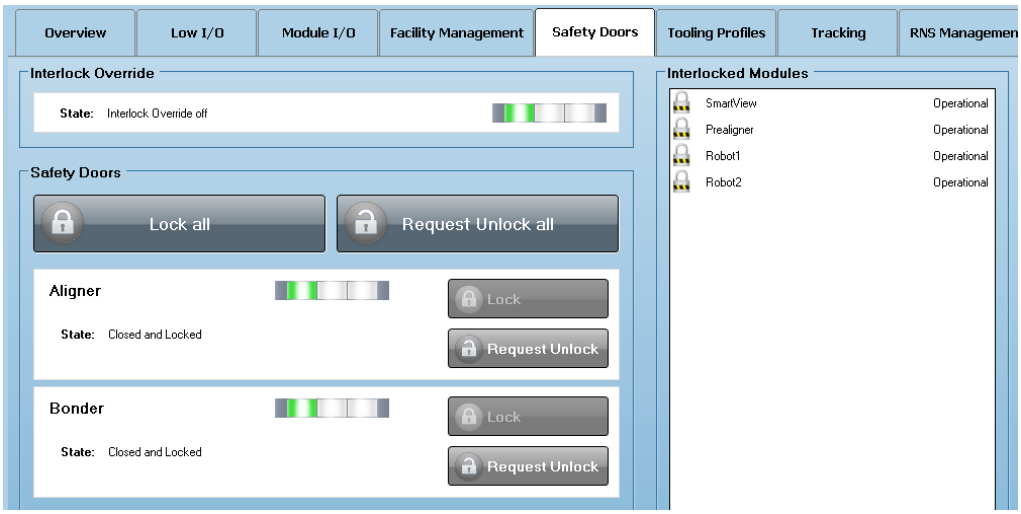

Figure 66 - Safety Doors Closed

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By default, the state of all safety doors is **Closed and Locked**.

Click **Request Unlock** or **Request Unlock all Safety Doors**. After unlocking the safety door, the state will change to **Closed**.

After opening the safety door, the state will change to **Open**.

The **Lock** button is deactivated until the doors are closed again.

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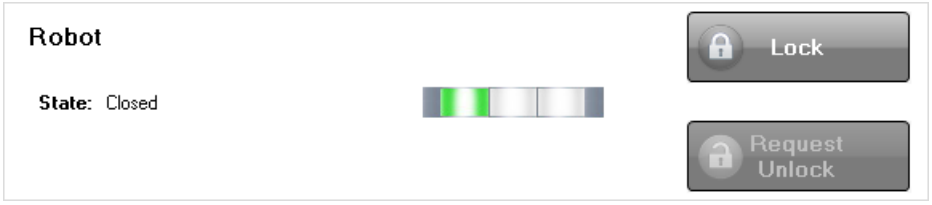
5.3 Close Safety Doors

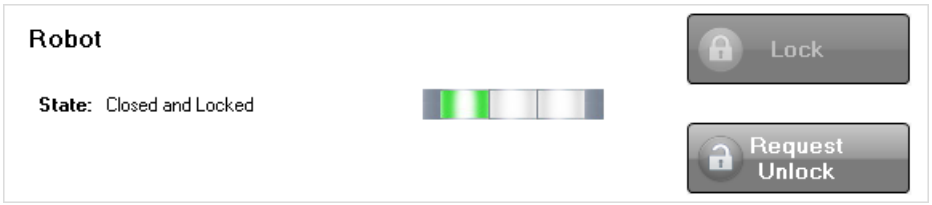
In the following example all safety doors are opened.

Figure 67 - Safety Doors Opened

After closing the safety doors, the state changes to **Closed** and the **Lock** button is activated again.



Click **Lock** or **Lock all Safety Doors** to lock the safety doors. The state changes to **Closed and Locked**.



As soon as all safety doors are closed and locked again, all modules will continue processing.

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6 Analysis

Click on the button **Analysis** in the bottom navigation bar:

The **Analysis** window will be opened which is divided in the following three tabs:

- Log Information
- DataValue State
- Performance Tracking

6.1 Log Information

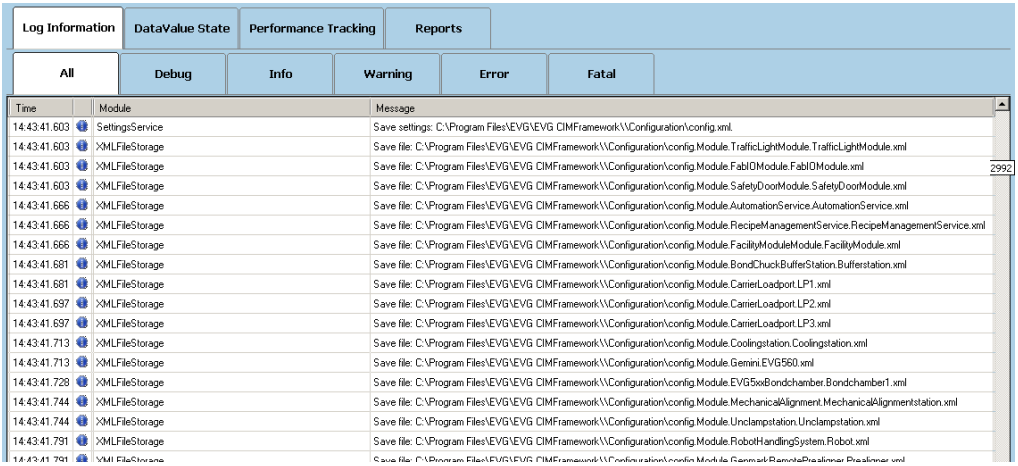
Log Information
DataValue State
Performance Tracking
Reports
All
Debug
Info
Warning
Error
Fatal
Time
Module
Message
14:43:41.603 SettingsService Save settings: C:\Program Files\EVG\EVG CIMFramework\\Configuration\config.xml
14:43:41.603 XMLFileStorage Save file: C:\Program Files\EVG\EVG CIMFramework\\Configuration\config.Module.TrafficLightModule.TrafficLightModule.xml
14:43:41.603 XMLFileStorage Save file: C:\Program Files\EVG\EVG CIMFramework\\Configuration\config.Module.FabIOModule.FabIOModule.xml
14:43:41.603 XMLFileStorage Save file: C:\Program Files\EVG\EVG CIMFramework\\Configuration\config.Module.SafetyDoorModule.SafetyDoorModule.xml
14:43:41.666 XMLFileStorage Save file: C:\Program Files\EVG\EVG CIMFramework\\Configuration\config.Module.AutomationService.AutomationService.xml
14:43:41.666 XMLFileStorage Save file: C:\Program Files\EVG\EVG CIMFramework\\Configuration\config.Module.RecipeManagementService.RecipeManagementService.xml
14:43:41.666 XMLFileStorage Save file: C:\Program Files\EVG\EVG CIMFramework\\Configuration\config.Module.FacilityModuleModule.FacilityModule.xml
14:43:41.681 XMLFileStorage Save file: C:\Program Files\EVG\EVG CIMFramework\\Configuration\config.Module.BondChuckBufferStation.Bufferstation.xml
14:43:41.681 XMLFileStorage Save file: C:\Program Files\EVG\EVG CIMFramework\\Configuration\config.Module.CarrierLoadport.LP1.xml
14:43:41.697 XMLFileStorage Save file: C:\Program Files\EVG\EVG CIMFramework\\Configuration\config.Module.CarrierLoadport.LP2.xml
14:43:41.697 XMLFileStorage Save file: C:\Program Files\EVG\EVG CIMFramework\\Configuration\config.Module.CarrierLoadport.LP3.xml
14:43:41.713 XMLFileStorage Save file: C:\Program Files\EVG\EVG CIMFramework\\Configuration\config.Module.Coolingstation.Coolingstation.xml
14:43:41.713 XMLFileStorage Save file: C:\Program Files\EVG\EVG CIMFramework\\Configuration\config.Module.Gemini.EVG560.xml
14:43:41.728 XMLFileStorage Save file: C:\Program Files\EVG\EVG CIMFramework\\Configuration\config.Module.EVG5xxBondchamber.Bondchamber1.xml
14:43:41.744 XMLFileStorage Save file: C:\Program Files\EVG\EVG CIMFramework\\Configuration\config.Module.MechanicalAlignment.MechanicalAlignmentstation.xml
14:43:41.744 XMLFileStorage Save file: C:\Program Files\EVG\EVG CIMFramework\\Configuration\config.Module.Unclampstation.Unclampstation.xml
14:43:41.791 XMLFileStorage Save file: C:\Program Files\EVG\EVG CIMFramework\\Configuration\config.Module.RobotHandlingSystem.Robot.xml

Figure 68 - Analysis

The following information will be displayed in the **Analysis** window:

Column:	Description:	Examples:
Timestamp	Time format: [hour]:[minute]:[second].[millisecond]	10:42:19.836
LogLevel	Type of logfile message (see below)	“Info”, “Error” or “Warning”
Module	Module name	“CIMFramework. EquipmentControlService”
Message	Logfile message	“Could not set process state.”

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Logfile Details

Double-click on a logfile message to open **Logfile Details**:

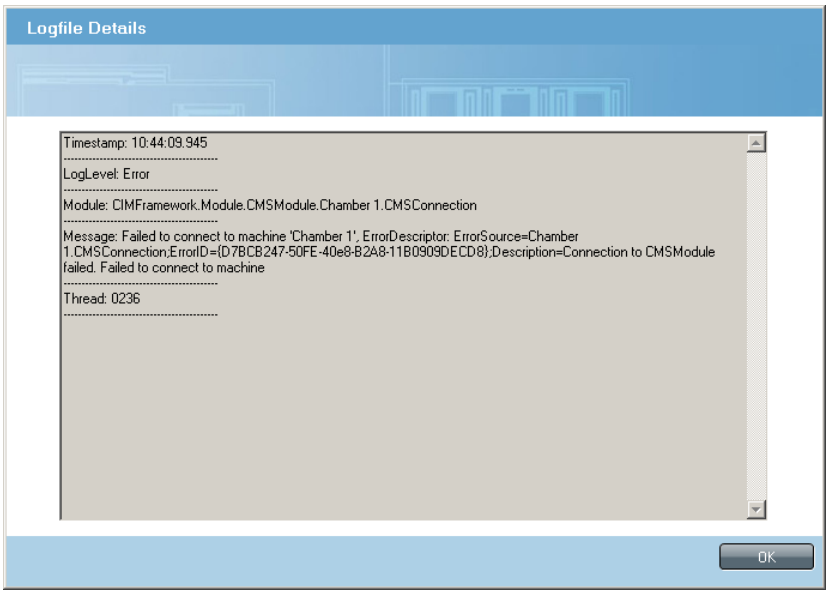
Logfile Details
Timestamp: 10:44:09.945
LogLevel: Error
Module: CIMFramework.Module.CMSModule.Chamber 1.CMSConnection
Message: Failed to connect to machine 'Chamber 1', ErrorDescriptor: ErrorSource=Chamber 1.CMSConnection;ErrorID={D7BCB247-50FE-40e8-B2A8-11B0909DECD8};Description=Connection to CMSModule failed. Failed to connect to machine
Thread: 0236
OK

Figure 69 - Logfile Details

6.2 DataValue State

The DataValue window visualizes all available data values and their current value. It includes status variables, data variables and equipment constants. The 1000 previous values are stored and displayed.

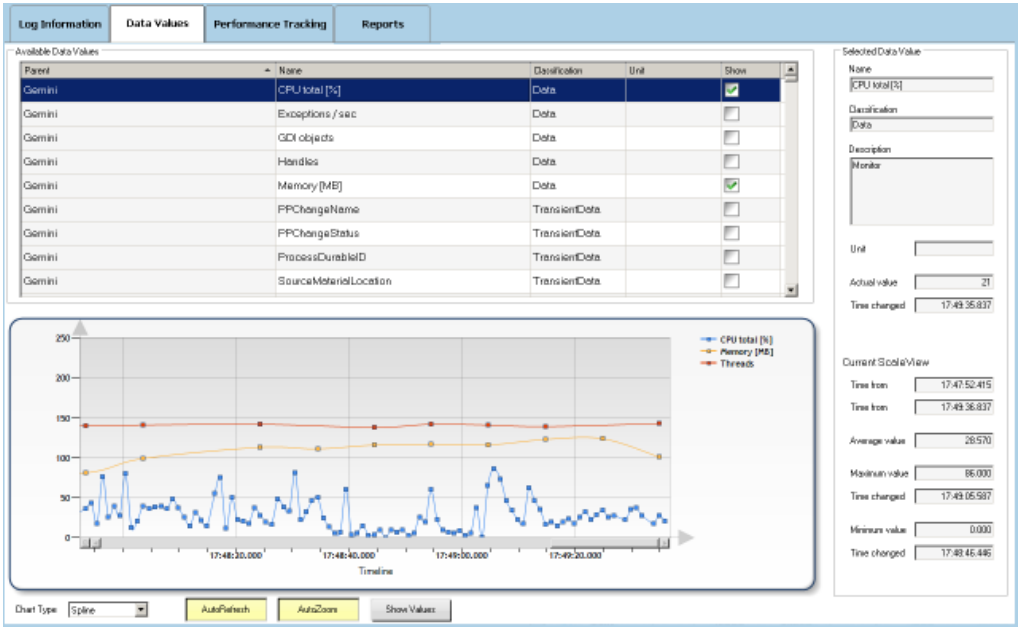

Figure 70 - DataValue State

6.3 Performance Tracking

This window allows analyzing performance statistics for the entire system and each module (e.g. idle time).

The data collected can be used for:

- Statistics
- Error analysis
- Analysis of module process and handling times
- Uptime calculations
- Throughput calculations

The performance is tracked by monitoring the time spent in each state (e.g. Idle, Busy and Blocked).

Figure 71 - Performance Tracking

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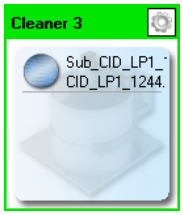
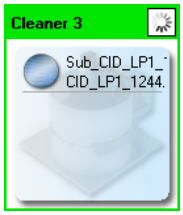
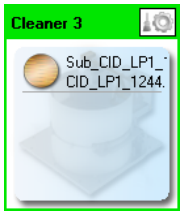
If more than one module is selected for performance tracking, a graph for each module will be displayed in a row. The values of all selected modules can be compared (see below).

Figure 72 - Comparing Performance

The current module performance state is also indicated by an icon on the header of each module (see example below).

Idle	Busy/Process	Busy/Waiting	Busy/Cleanup	Blocked
				

6.4 Reports

The **Reports** window allows collecting and listing certain events and its corresponding parameters (e.g. process started or finished).

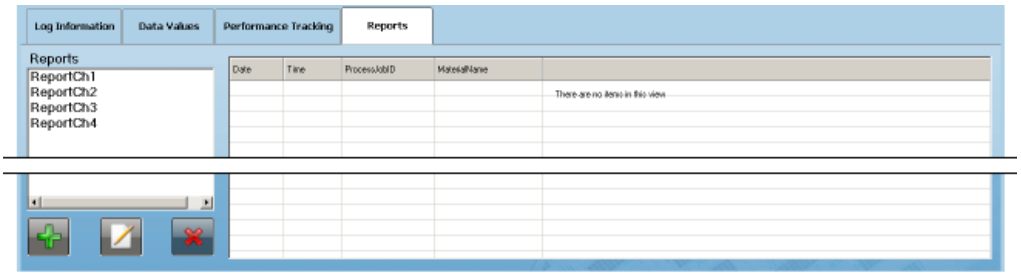


Figure 73 - Reports

Click the following button to create a new report for an event.

Adjust the report filter settings and click **OK** to confirm.

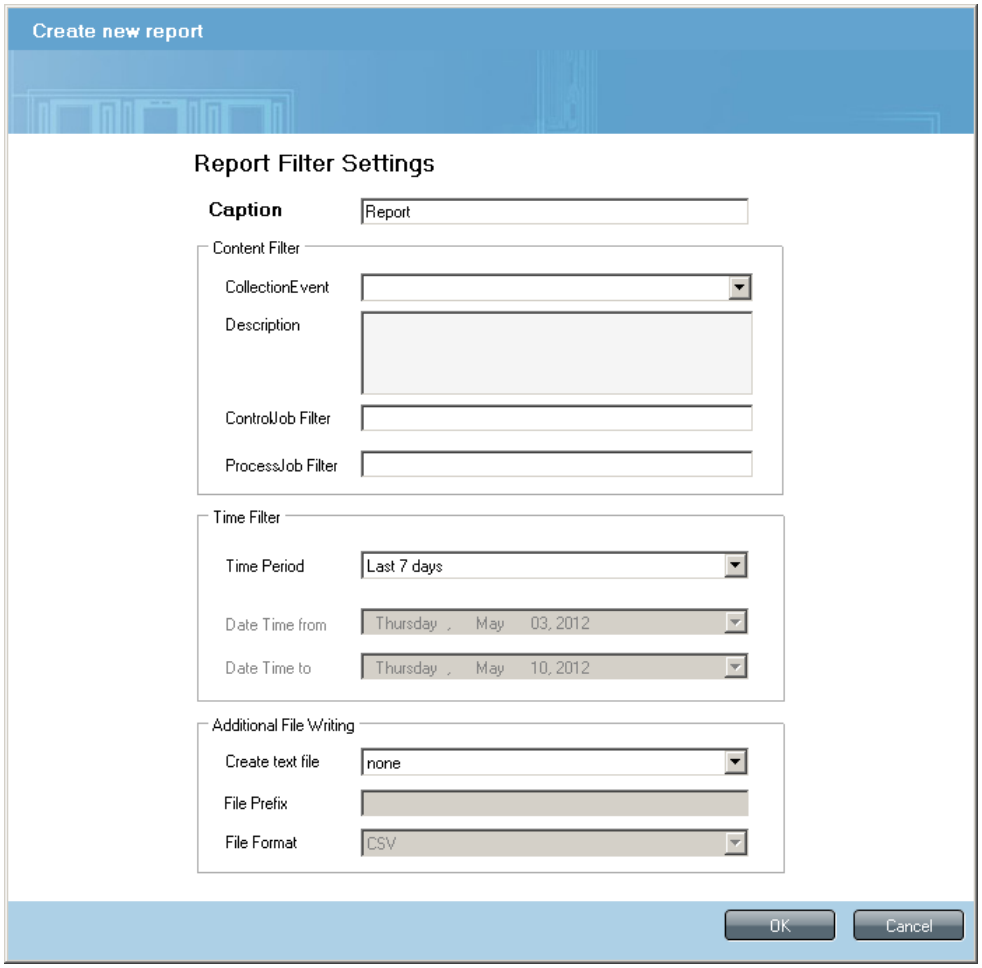


Figure 74 - Report Filter Settings

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7 Alarms

7.1 Overview

The **Alarms** window can be opened by clicking on **Alarms** (1) in the bottom navigation bar or by clicking on the status information icon (2) displaying the status (e.g. “OK”):

The **Alarms** window will be opened:

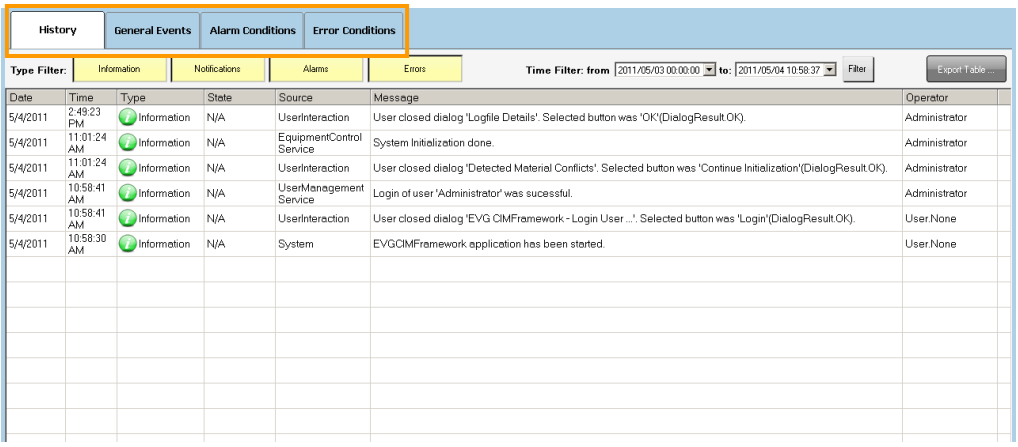
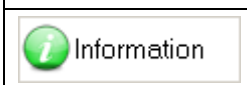

History
General Events
Alarm Conditions
Error Conditions
Type Filter:
Information
Notifications
Alarms
Errors
Time Filter: from 2011/05/03 00:00:00 to: 2011/05/04 10:58:37
Filter
Export Table ...
Date Time Type State Source Message Operator
5/4/2011 2:49:23 PM Information N/A UserInteraction User closed dialog 'Logfile Details'. Selected button was 'OK'(DialogResult.OK). Administrator
5/4/2011 11:01:24 AM Information N/A EquipmentControl Service System Initialization done. Administrator
5/4/2011 11:01:24 AM Information N/A UserInteraction User closed dialog 'Detected Material Conflicts'. Selected button was 'Continue Initialization'(DialogResult.OK). Administrator
5/4/2011 10:58:41 AM Information N/A UserManagement Service Login of user 'Administrator' was sucessful. Administrator
5/4/2011 10:58:41 AM Information N/A UserInteraction User closed dialog 'EVG CIMFramework - Login User ...'. Selected button was 'Login'(DialogResult.OK). User.None
5/4/2011 10:58:30 AM Information N/A System EVGCIMFramework application has been started. User.None

Figure 75 - Alarms

Timestamp	Time format: [hour]:[minute]:[second].[millisecond]
Type	Type of the event (e.g. “Information”).
Source	e.g. Module
Message	Alarm message
Operator	Operator (e.g. Administrator)

	Recoverable, dialog with options.
	Information only
	Necessary actions

7.2 Alarm Situation

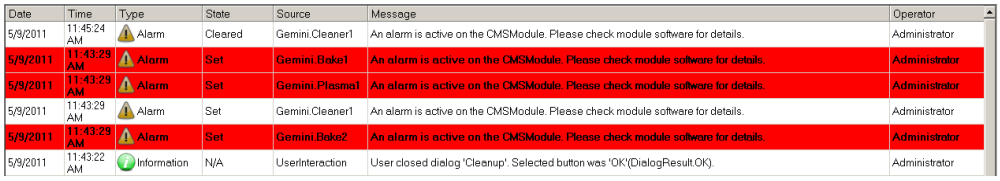
If there is an error, the button in bottom navigation bar and the icons on the top right corner of the screen will change to the following:

Button in bottom navigation bar:

Icons on top right corner of the screen:

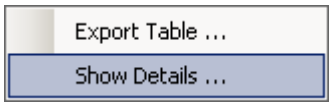
The number in the alarm icon indicates the number of active alarms or errors.

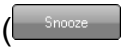
Click the button **Alarms** or the red alarm icon on the top right corner of the screen to open **Alarms** window.



Date	Time	Type	State	Source	Message	Operator
5/9/2011	11:45:24 AM	Alarm	Cleared	Gemini.Cleaner1	An alarm is active on the CMSModule. Please check module software for details.	Administrator
5/9/2011	11:43:29 AM	Alarm	Set	Gemini.Bake1	An alarm is active on the CMSModule. Please check module software for details.	Administrator
5/9/2011	11:43:29 AM	Alarm	Set	Gemini.Plasma1	An alarm is active on the CMSModule. Please check module software for details.	Administrator
5/9/2011	11:43:29 AM	Alarm	Set	Gemini.Cleaner1	An alarm is active on the CMSModule. Please check module software for details.	Administrator
5/9/2011	11:43:29 AM	Alarm	Set	Gemini.Bake2	An alarm is active on the CMSModule. Please check module software for details.	Administrator
5/9/2011	11:43:22 AM	Information	N/A	UserInteraction	User closed dialog 'Cleanup'. Selected button was 'OK'(DialogResult.OK).	Administrator

Right-click a line and click **Show Details…** or double-click a line to find further details about the alarm:



Alarm details will be opened (

button available depending on alarm type):

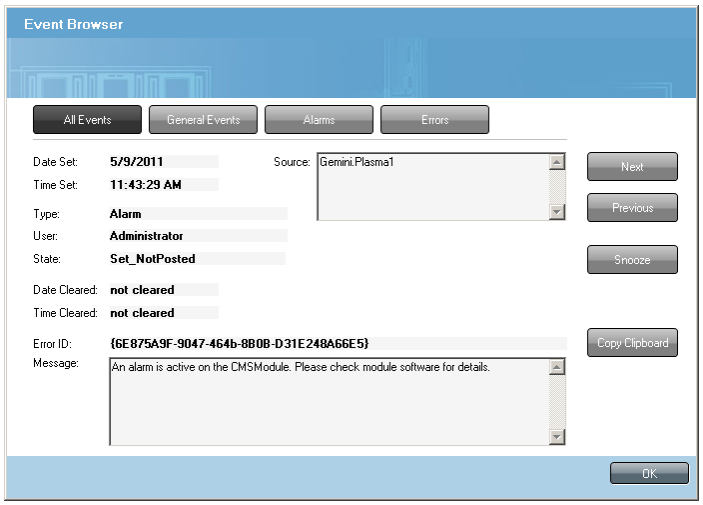


Figure 76 - Event Browser

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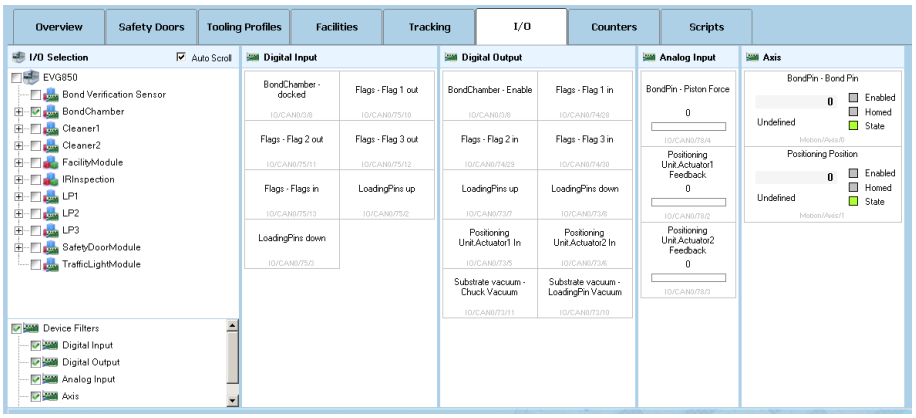
8 I/O

Depending on the module, the I/O displays a list of I/O information and controls (e.g. digital input, digital output, analog input, axis and gauge).

1) Go to System > I/O to open the I/O window.
2) Select one or more modules from the list on the right to display its I/O information and controls.



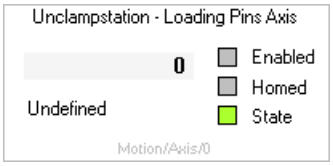
Notice:

If not handled with care, changing settings in I/O can cause severe damage to the system. There are no software security blocks that guard the system. Only authorized personnel may use the I/O. If damage is caused by unauthorized personnel the warranty will be lost.

8.1 I/O Axis Field

The Low I/O Axis Field displays position and state of axes.

All mapped axes are shown in Low I/O and all axes of a module are shown in Module I/O.



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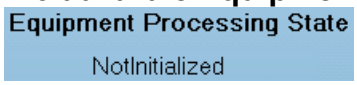
9 Shut Down

Note: All safety doors have to be closed and locked before shutting down the system (refer to chapter 5 Safety Doors)!

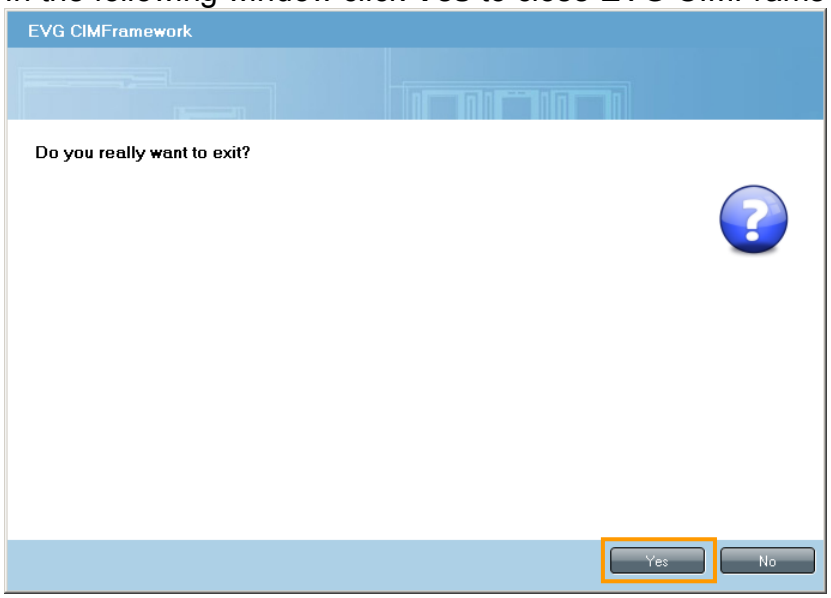
1) After finishing all running processes click **Shutdown** in the **System** window:

2) Wait until the **Equipment Processing State** is **NotInitialized**:



3) Click **Close Application**:

4) In the following window click **Yes** to close EVG CIMFramework:



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5) In EVG Explorer click the shut down button (see below):

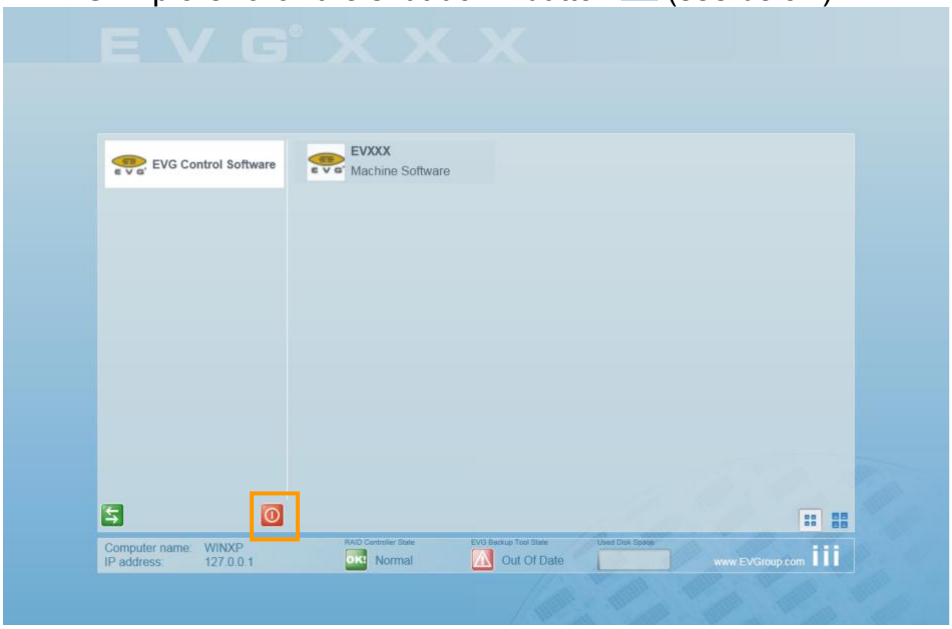

Figure 77 - Shut down button in EVG Explorer

6) In the shut down window select **Shut down** (default) and click **OK** to shut down the operating system:

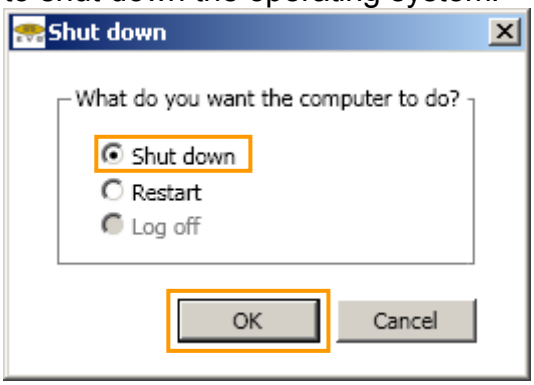

Figure 78 - "Shut down"-window

7) Wait until the screen "**It is now safe to turn off your computer**" shows up and then turn off the system.

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History

Date	Modification	by
2010-10-20	First written with SPU, OC, ACS	WAA
2011-05-18	Updated to core manual with SSN	WAA
2011-11-17	Updated to version 2.0	WAA
2012-05-10	Updated to version 2.1	WAA
2012-12-06	Updated to version 2.2	WAA
2013-05-07	Updated to version 2.3 and combined Basic and Advanced	WAA

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State:	Released		Author:	WAA
File:	EVG_Framework_EO_eng_2.3.doc			
Created on:	2012-12-06		Printed on:	2013-05-07
Version:	2.3		Last revision	2013-03-26
Purpose:	Operation		Language:	EN

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Bond Module

Customer Support Documentation
EVG CIMFramework

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1 Module Description

1.1 Wafer Bonding

„Wafer-to-wafer“ and „chip-to-wafer“ (or “die to wafer”) are key enabling processes for manufacturing of various devices ranging from Micro-Electro- Mechanical Systems (MEMS) to advanced chips based on 3D integration and advanced wafer-level packaging.

EVG®500 and Gemini® equipment series are designed to enable the use of various wafer bonding processes based on different principles and using a large variety of substrates and bonding layers (Figure 1).

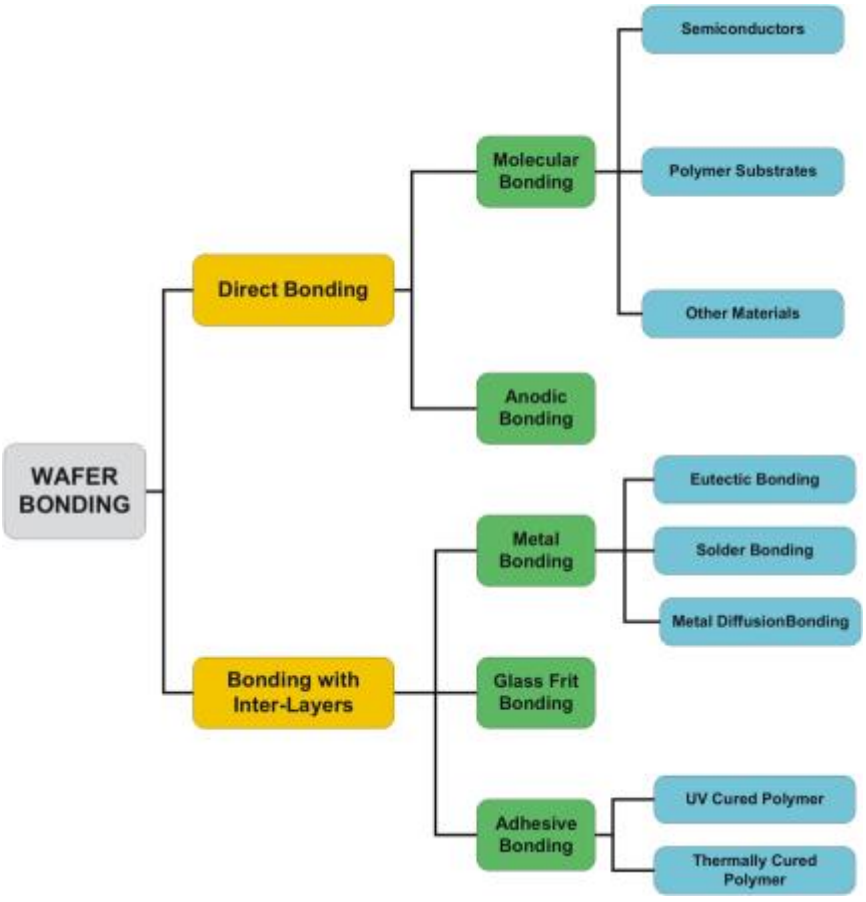

Figure 1 - Wafer bonding processes classification with examples of substrates types

The equipment described in this document is designed as a universal tool allowing easy use and operator-friendly operation.

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1.2 Bond Module

The bond module is used to perform wafer bonding processes (as described in the previous chapter).

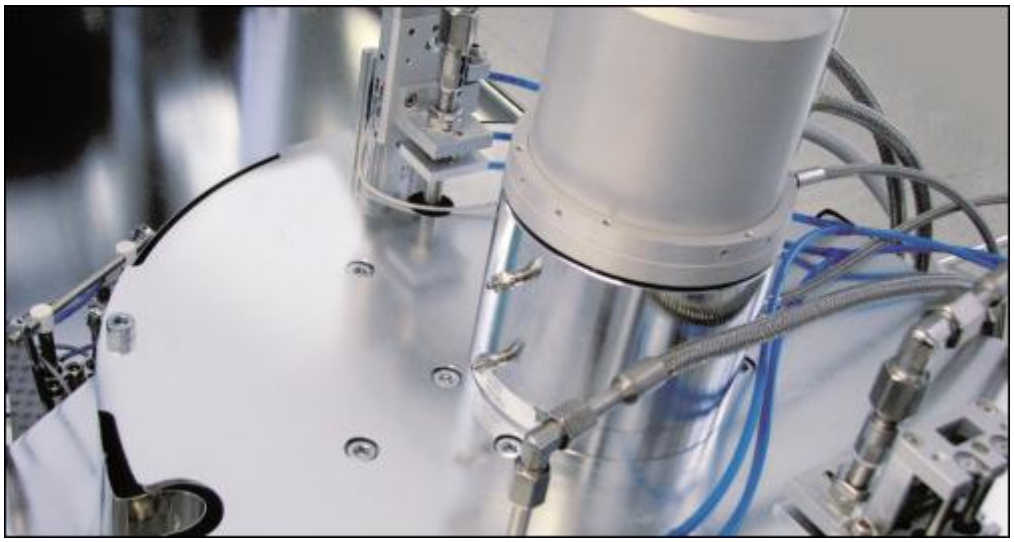

Figure 2 - Bond Module

The number of bond modules in the system can vary depending on the system configuration.

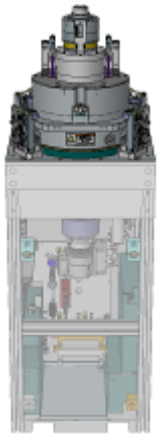

Figure 3 - Bond Chamber on Bond Module

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Main components of the bond chamber

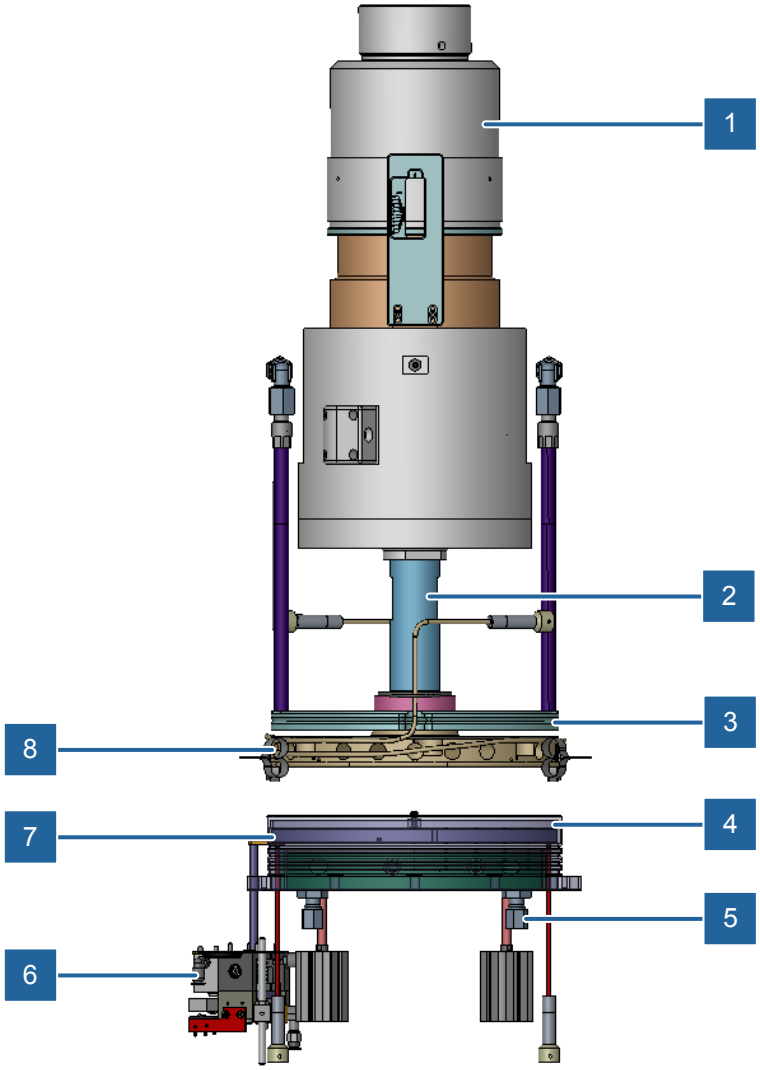

Figure 4 - Overview main components

1	Wafer bow actuator	2	Piston
3	Top side cooling chuck	4	Thermo chuck
5	Bottom side cooling chuck	6	Flag pulling mechanism
7	Bottom side heater	8	Top side heater

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1.3 Bond Chuck

The substrates are fixed (clamped) on the bond chuck and the bond chuck will then be processed (applying pressure, temperature and vacuum) in the bond chamber.

The bond chuck design depends on the system configuration. The following figure shows an example bond chuck design:

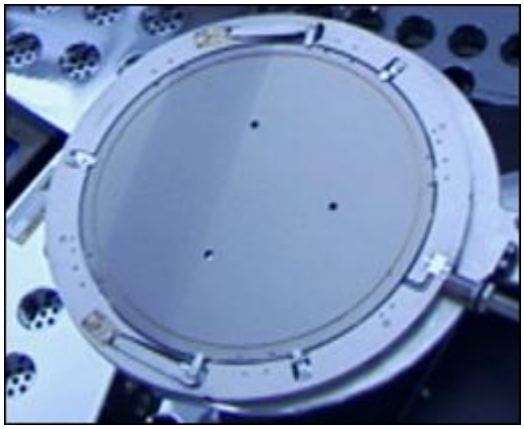
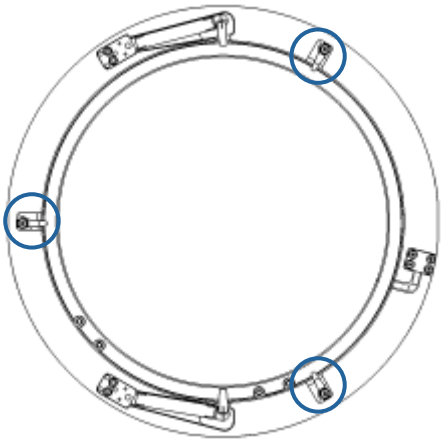
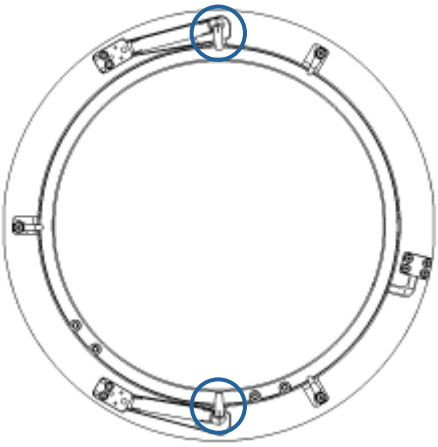


Figure 5 - Bond Chuck

The three separation flags on the bond chuck keep the substrates separated before processing them in the bond chamber.



The two clamps on the bond chuck clamp the substrates onto the bond chuck. They can be released in order to remove the substrates from the bond chuck.



1.4 Safety

Refer to **Interlock List** to find a detailed description about the location and functionality of all safety interlocks (e.g. Emergency OFF Button) on the system.

1.4.1 Start Heating – Heating not Possible

When the temperature of the heating cartridge ground plate gets over 80°C, the over temperature switch releases the heaters switch (controlled by EVG Bond Software) and the heaters are shut off immediately.

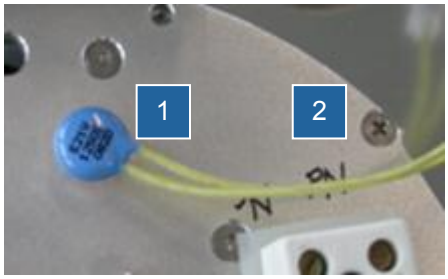


Figure 6 - Over Temperature Switch

1	Over temperature Switch	2	Heating Cartridge

If you want to start heating again, you have to switch on the heater switch (controlled by EVG Bond Software) and restart your process.

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1.4.2 Safety Switches in Cover Clamps (if equipped)

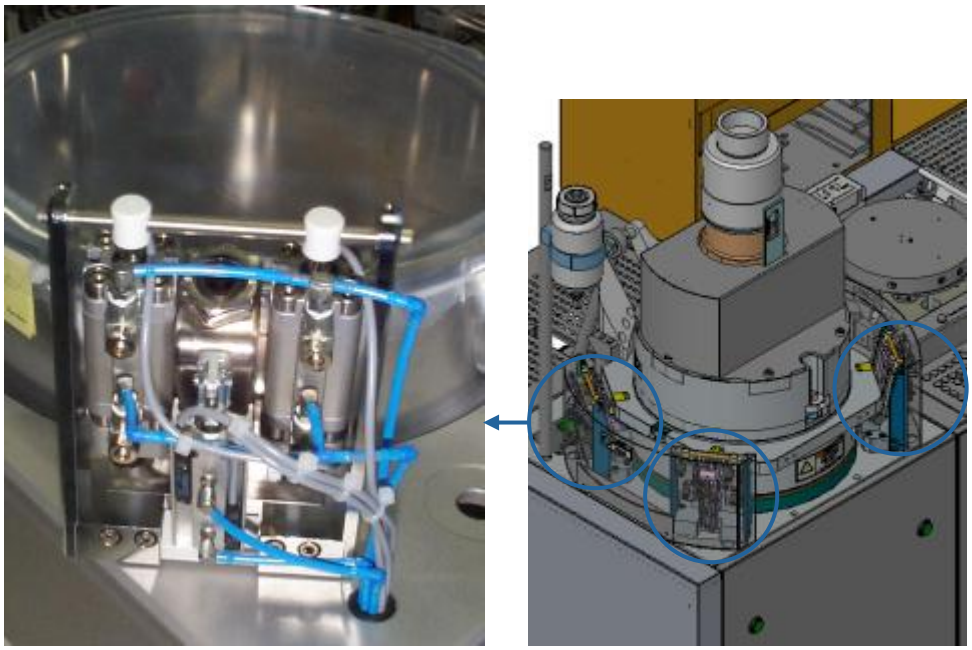

Figure 7 - Cover Clamp

If the four cover clamps on each bond module are not closed properly when trying to start a process, an error message will occur (“Cover not locked. Not possible to start process!”). Open the cover again and check the stack height (16mm). Close the cover and try to restart the process.

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1.4.3 Facility Problems

1.4.3.1 Missing Water Flow

If the water flow is missing a timer will be started (standard: 2 minutes) and a message box will appear on the screen. Click on “OK” to confirm the message box.

In the meantime the chamber will continue processing but the handling will be paused.

Water flow resumes in time:	Water flow does not resume in time:
If the water flow resumes within the time set, the message box has to be confirmed by the user.	If the water flow does not resume within the time set, all heaters will be shut down and the process will be aborted.

Note: The message box has to be confirmed even if the water flow resumes in time! Otherwise the process could be paused at some point until the message box is confirmed.

1.4.3.2 Missing CDA

If the CDA pressure is missing a timer will be started (default: 2 minutes, maximum: 5 minutes) and a message box will appear on the screen. Click on “OK” to confirm the message box.

In the meantime the chamber will continue processing but the handling will be paused.

CDA pressure resumes in time:	CDA pressure does not resume in time:
If the CDA pressure resumes within the time set, the message box has to be confirmed by the user. The handling will resume.	If the CDA pressure does not resume within the time set, the process will be aborted.

Note: The message box has to be confirmed even if the CDA pressure resumes in time! Otherwise the process could be paused at some point until the message box is confirmed.

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2 Process Description

The following chapters describe processes that can be performed on EV Group wafer bonding equipment.

2.1 Direct Wafer Bonding

This is a wafer bonding method in which the adhesion between two surfaces occurs as a result of chemical bonds established between molecules from the two surfaces. Typically the adhesion is weak at room temperature (mediated by Van der Waals forces) and maximum bond strength is reached by transforming the weak bonds into covalent bonds through a high temperature thermal annealing (process flow shown in fig. 1).

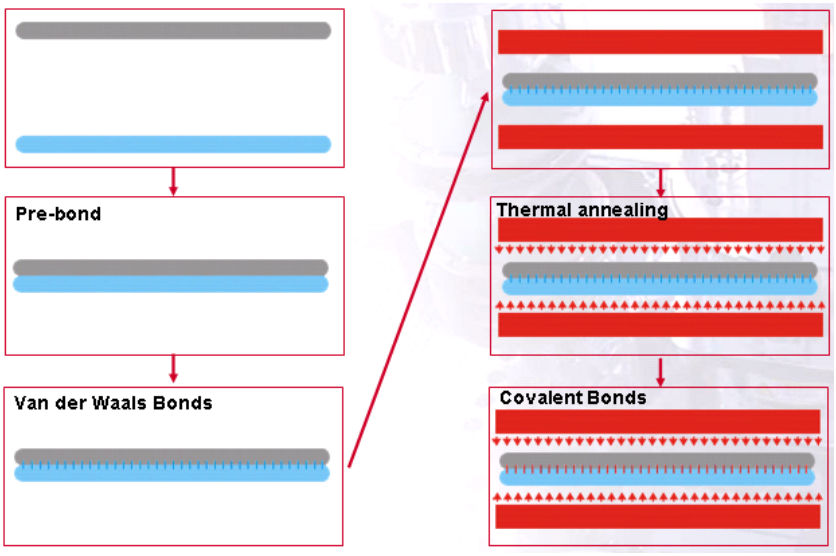

Figure 8 - Direct wafer bonding process flow

For Si-Si direct bonding the annealing temperature is >600°C for hydrophobic bonding (SiO2 removed from Si prior bonding by 1-2% HF) or >900°C for hydrophilic bonding (with native, thermally grown or deposited oxides). After correct thermal annealing the bond strength reaches same range as Si bulk fracture strength.

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Surface activated wafer bonding is also a direct bonding method which uses a special surface preparation process (surface activation) in order to change and control the bonding mechanism by controlling the surface chemistry. After surface activation, higher energy bonds are formed at room temperature (even covalent) compared to the non-activated surfaces and thus the energy required to reach the maximum bond strength by forming covalent bonds across the entire bonded interface is lower. As a result, the annealing temperature and annealing time in this case are much lower than in a standard direct bonding process. The annealing temperature for this type of process ranges from room temperature to 400°C, depending on materials to be bonded.

The typical surface activation used for this process is a plasma activation using an EVG®800 series plasma chamber for accurate process control.

Typical materials used for direct wafer bonding under various process conditions are:

- Si, silica, quartz, quartz glass (), other glasses (e.g. borofloat, BK7, special properties glasses)

- Compound semiconductors (GaAs, InP, GaP, etc.)

- Oxide materials (LiNbO3, LiTaO3, etc.)

The general requirement of direct bonding is that surfaces have a microroughness <0.5 nm (in some situations even higher values may be acceptable, depending on process conditions boundaries). Microroughness is typically defined as surface Rms measured by Atomic Force Microscope (AFM) on 2 x 2 µm² areas across the substrate.

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2.2 Anodic Wafer Bonding

Initially reported for joining a metal surface to a glass surface, the term “anodic bonding” is used today mainly to identify the bonding of silicon wafers to glass wafers with high content of alkali oxides (fig. 2). The glass materials mostly used for anodic bonding are Borofloat® from Schott Glass - Germany, and Pyrex®7740 from Corning Inc., USA.

The bond occurs when the two wafers are heated after being brought in contact and an electric field is applied. At a certain temperature (depending on the glass composition) oxides dissociate and the mobile alkali ions are driven by the electric field into the glass, creating an oxygen rich layer at the silicon-glass interface. Oxygen ions are driven by the electric field to the silicon surface and produce oxidation of Si. The resulting bond strength is very high and the process is irreversible.

In terms of equipment, it is important for the bond chamber to provide good temperature uniformity and ensure good electrical contacts.

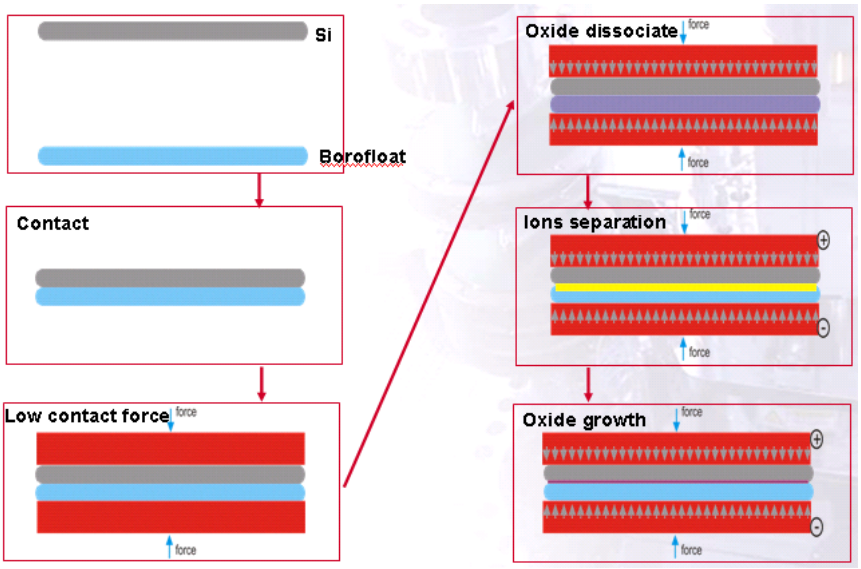

Figure 9a - Anodic wafer bonding process flow

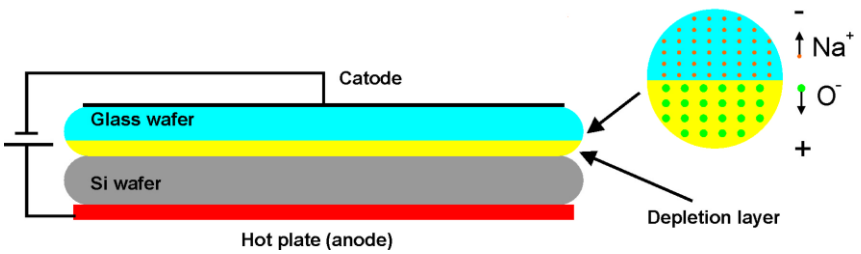

Figure 2b - Bonding mechanism

2.3 Adhesive Wafer Bonding

Adhesive wafer bonding is a technique using an intermediate layer for bonding. Polymers, spin-on glasses, resists and polyimides are some of the materials suitable for use as intermediate layers for bonding. The choice of the material for intermediate layer is always made considering the substrate materials and topography.

The main advantages of using this approach are: low temperature processing (maximum temperatures below 400°C), surface planarization and tolerance to particles (the intermediate layer can incorporate particles with the diameter in the layer thickness range).

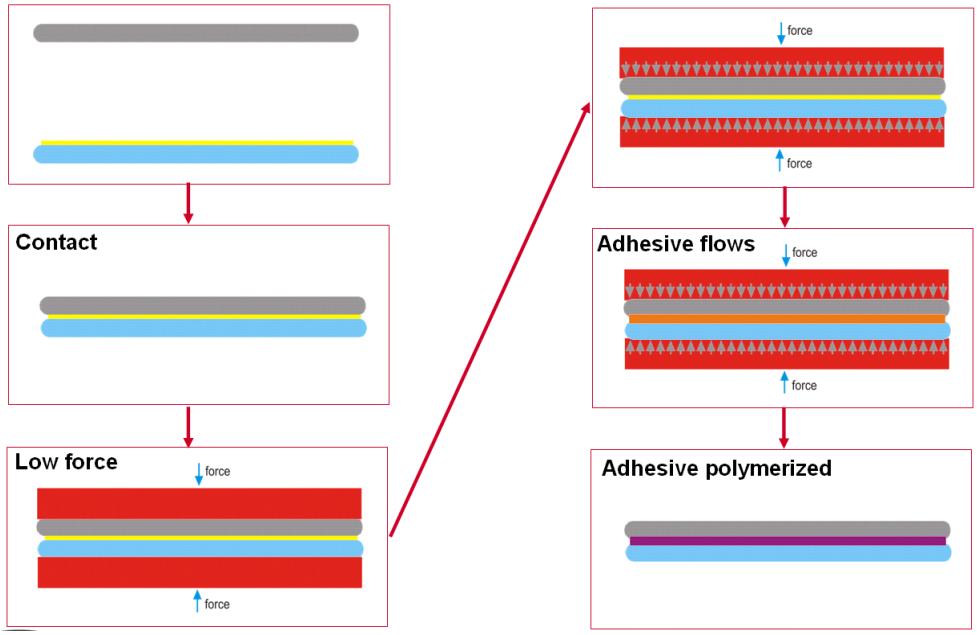

Figure 10 - Adhesive wafer bonding general process flow

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2.4 Glass Frit Wafer Bonding

This type of bond is using as intermediate layer for bonding a low melting point glass. The bond occurs by heating the substrates with applied contact force (fig. 4).

Glass frit bonding has a high tolerance to surface roughness and can incorporate high topography of the substrates. Glass frit material can be deposited by screen printing or used as glass preformed sheets. This process is very reliable and is used in high volume production by major MEMS devices manufacturers for applications where low vacuum encapsulation is required.

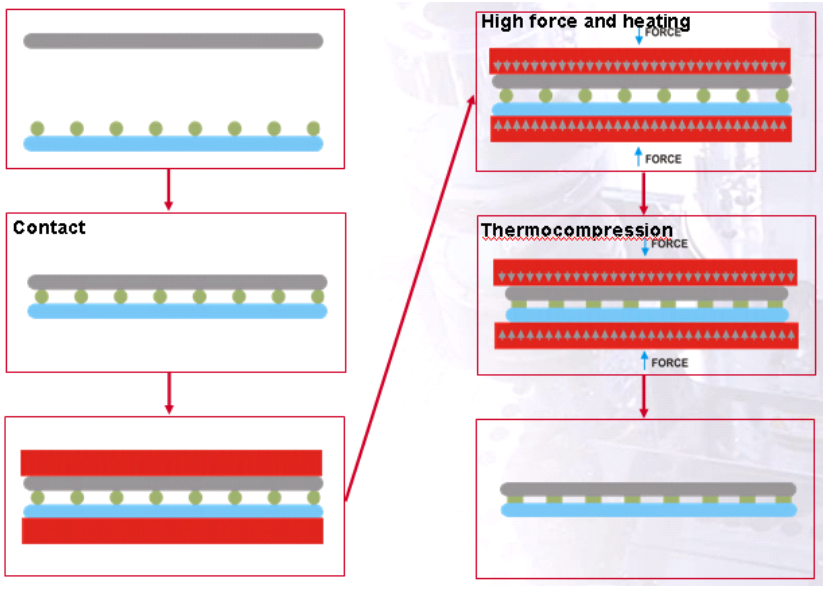

Figure 11 - Glass frit wafer bonding general principle

2.5 Eutectic Wafer Bonding

This is a wafer bonding process which uses as bonding layer an eutectic alloy formed during bond process. Eutectic alloy is formed at the bonding interface in a process which goes through a liquid phase: for this reason, eutectic bonding is less sensitive to surface flatness irregularities, scratches, as well as to particles compared to the direct wafer bonding methods (metal layer can incorporate particles with diameter lower than the eutectic layer thickness).

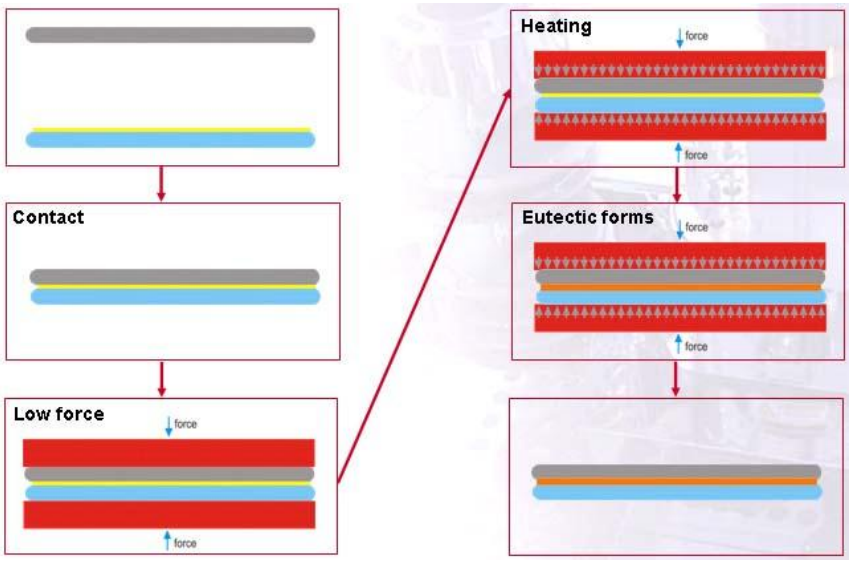

Figure 12 - Eutectic wafer bonding process flow

Some of the main eutectic alloys used for wafer bonding applications are listed in table 1.

Eutectic System	Eutectic Temperature	Bonding Temperature (recommended)
Au:Sn (80:20)	Au:Sn- 300°C	290°C
Au:Si	363°C	375°C
Au:Ge	380°C	390°C
Al:Ge	423°C	435°C
Au:In	510°C	520°C

Table 1 - Main eutectic combinations used for wafer bonding

For a successful eutectic bonding process it is very important that bonder assures a good temperature uniformity across the entire wafer surface and also to control very well the temperature value (avoid overshooting the setpoint) in order to have a reliable process.

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Experimental results showed that good quality interfaces are obtained when temperature is raised to a value lower than the eutectic temperature (heating simultaneously from top/bottom), maintained constant for short time to reach uniform heating of both wafers, than increased again by heating both heaters to a temperature exceeding the eutectic point with 10-20°C (depending on specific process conditions and on substrates restrictions) followed by cooling down to a temperature below the eutectic temperature.

A typical thermal profile of a eutectic wafer bonding process is shown in fig. 6.

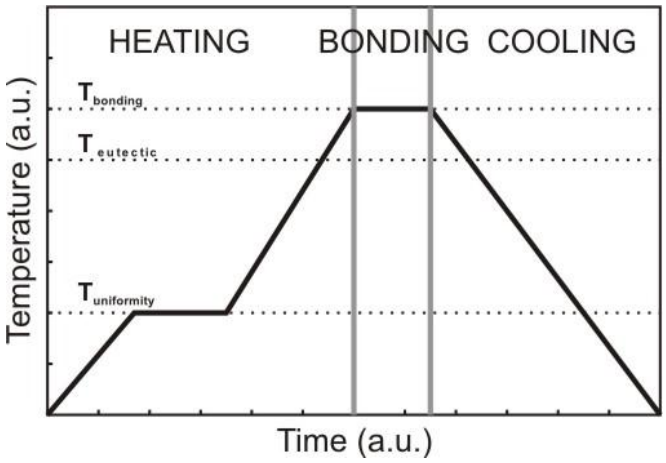

Figure 13 - Schematic thermal profile of a eutectic wafer bonding process

Eutectic wafer bonding does not require application of high contact force. Due to the liquid phase formed during the process, high contact force results always in metal squeezing out of the interface, resulting in poor interface layer uniformity as well as contamination of the bond tools and bond chamber. The role of the light contact force required is just to ensure good contact of the two wafers and good contact of the two heaters of the bonder with wafers' back sides.

Eutectic wafer bonding is a good candidate to high-vacuum applications as this process has a very low specific outgasing due to the use of only high purity components. The liquid melt formed during process can only enhance the high vacuum compatibility by allowing high quality sealing even on non-perfect surfaces.

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2.6 Transient Liquid Phase (TLP) Wafer Bonding

For some applications the process temperatures must be lower than the bonding temperatures of the most usual eutectic alloys (300°C - 400°C). In such situations an alternative process can be used, which results in an inter-metallic compound bonding layer. In literature this process is known under different names among which can be mentioned “diffusion soldering” or Transient Liquid Phase (TLP) bonding.

This bonding process is an advanced type of solder bond that can form high-quality hermetic seals at lower temperatures than other bonding technologies. This technique uses one thin layer of metal (typically 1-10µm thick) which during a thermal process diffuses into its bonding partner forming an inter-metallic compound layer with re-melting temperature higher than the bonding temperature (table 2). The process flow and recommended thermal profile are same as for eutectic wafer bonding (fig. 6).

Component 1 (thick)	Component 2 (thickness)	Bonding temperature	Diffusion time	Remelting temperature
Cu	Sn (1µm) Sn (5µm)	280°C 300°C	4 min. 20 min.	>415°C >676°C
Au	In (2µm) In (5µm) In (2µm)	260°C 200°C 160°C - 240°C	15 min. 30 sec. 10 min.	>278°C >495°C >495°C
Ag	Sn (2µm) Sn (5µm)	250°C - 350°C 250°C	10 min. 60 min.	>600°C >600°C

Table 2 - Examples of metals which can be used for Transient Liquid Phase (TLP)

* Table adapted from [G. Humpston, and D. Jacobson, in Principles of Soldering, ASM International 2004, p. 231]. Times correspond to full diffusion of the specified thickness of Component 2.

Same as eutectic wafer bonding, diffusion soldering bonding is attractive for MEMS vacuum packaging as the process is completed at low temperatures (150°C - 300°C) and can withstand much higher temperatures after bonding (see Table 2), bonding layers are made out of metals (low permeability), and they can planarize over surface defects or particles resulting from prior processes.

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2.7 Metal Thermo-compression Wafer bonding

Quite often people are wrongly considering that thermo-compression and eutectic bonding are one single process. In thermo-compression bonding process the two surfaces adhere to each other due to a metal bond established between two metal surfaces pressed together under heating. The bonding mechanism is enhanced by the deformation of the two surfaces in contact in order to disrupt any intervening surface films and enable metal-to-metal contact (fig. 7). By heating the two metal surfaces the contact force applied for the bond process can be minimized. High force uniformity across the bonding area results in high yield.

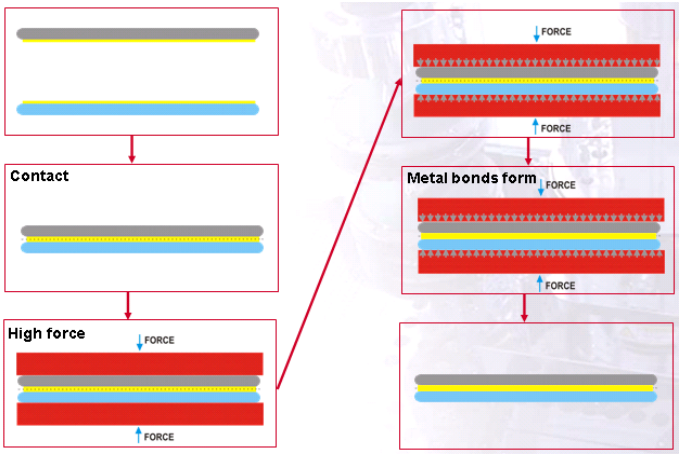

Figure 14 - Metal thermo-compression wafer bonding process flow

There are several metals used for metal thermo-compression bonding, as Au, Cu or Al. These are considered interesting for wafer bonded MEMS applications mainly due to their availability in main microelectronics applications. Their use for one or another type of applications is conditioned by the type of substrates used (e.g. no Au-containing substrates can be further processed in CMOS lines).

Typically the metals used for this process are evaporated, sputtered or electroplated on the surface. In such process it is extremely important to assure a proper diffusion barrier or adhesion layer between the metal bonding layer and its substrate.

The surface microroughness of the metal bonding layers ranges from <1nm and up to few tens of nm, depending on the metal used, on deposition technique and on the wafer bonding process conditions.

Important:
The aim of this section of the operator manual is to offer a short overview of the available wafer bonding processes which can be performed in EVG permanent bonding equipment.
For detailed discussion regarding substrates or bonding layers specifications, general process conditions or specific applications-related topics EVG customers are advised to contact a qualified EVG process engineer.

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3 GUI

3.1 Jobs

Click **Jobs** in the bottom navigation bar:

3.1.1 Overview Stations

The overview of all stations contains one or more bond module icons depending on the system configuration.

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3.2 Modules

3.2.1 Bond Module

Go to **Modules** and open the **BondModule** tab. It contains information about the current status of the bond module and vacuum system.

3.2.1.1 Parameter

This frame displays information about the current status of the bond module (e.g. temperature or force).

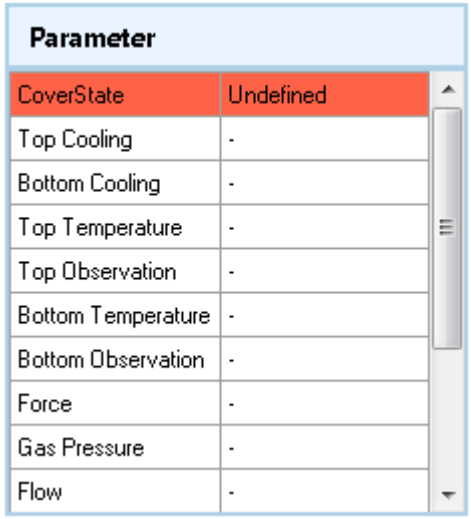

Figure 15 - Parameter

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The **Parameter** frame can contain the following information (depending on system configuration):

CoverState	state of the cover (opened, closed)
Top Temperature	temperature of top heater
Top Cooling	temperature of top cooling chuck
Top Observation	observation temperature of top heater
Bottom Temperature	temperature of bottom heater
Bottom Cooling	temperature of bottom cooling chuck
Bottom Observation	observation temperature of bottom heater
Force	force that is applied
Gas Pressure	it is the pressure reading in the chamber
Flow	shows the flow rate of the purge gas through the mass flow controller
Vacuum	vacuum in the bond chamber
Voltage	voltage applied to the substrate
Current	current applied to the substrate
Charge	charge applied to the substrate
Flags	status of flags (if they are moved in or out)
Waferbow	waferbow setting (on or off)

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3.2.1.2 Process Information

This frame displays information about the current process. This frame is only active when a process is running.

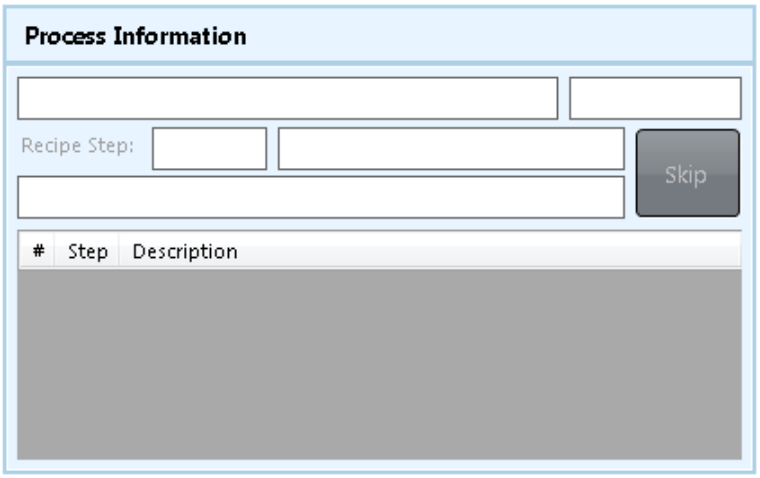

Figure 16 - Process Information

3.2.1.3 Vacuumsystem

Refer to “Technical Documentation” => “Vacuum Equipment” for detailed information about the vacuum system.

Open the **Jobs** window and go to **Overview Stations** to find the vacuum system overview:

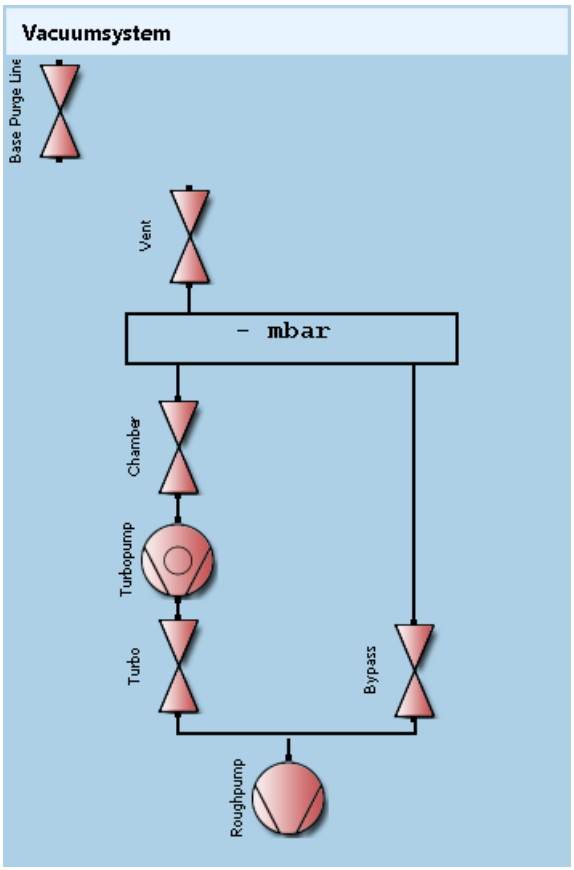

Figure 17 - Vacuum System

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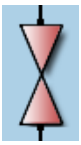
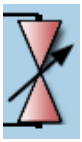
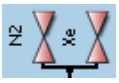
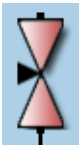
It depends on the system configuration which symbols you have in the vacuum system overview:

Symbol	Designation
	Valve/Flow control valve Different Types: • Bypass valve • Turbo valve • Chamber valve • Vent valve • Purge valve • Base Purge Line • Manual Purge Line
	Roughingpump
	Turbopump
	MFC – Mass Flow Control
	Gases
	Vacuum Controller

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4 Recipe Programming

4.1 Overview

Click **Recipes** in the bottom navigation bar:

The **Recipes** window will be opened:

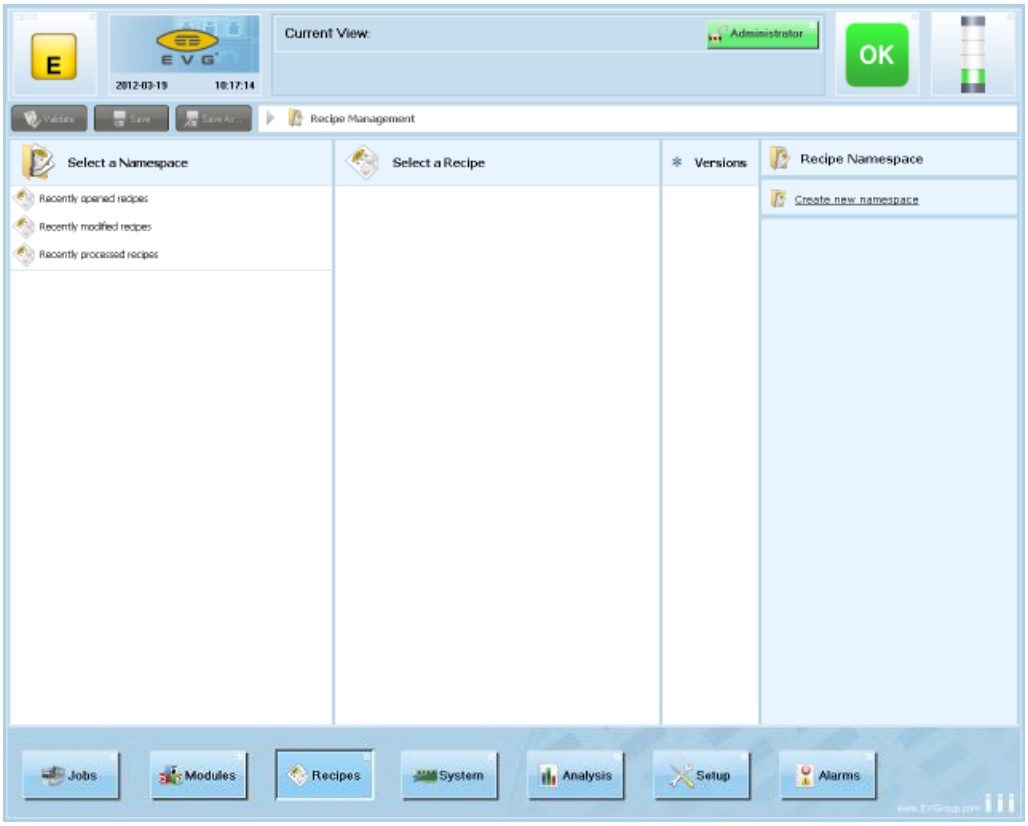

Figure 18 - Recipe Window

Note: This document contains all information relevant to bond module recipes. Refer to chapter Recipe Programming in the advanced Framework manual to find general information needed for working with recipes.

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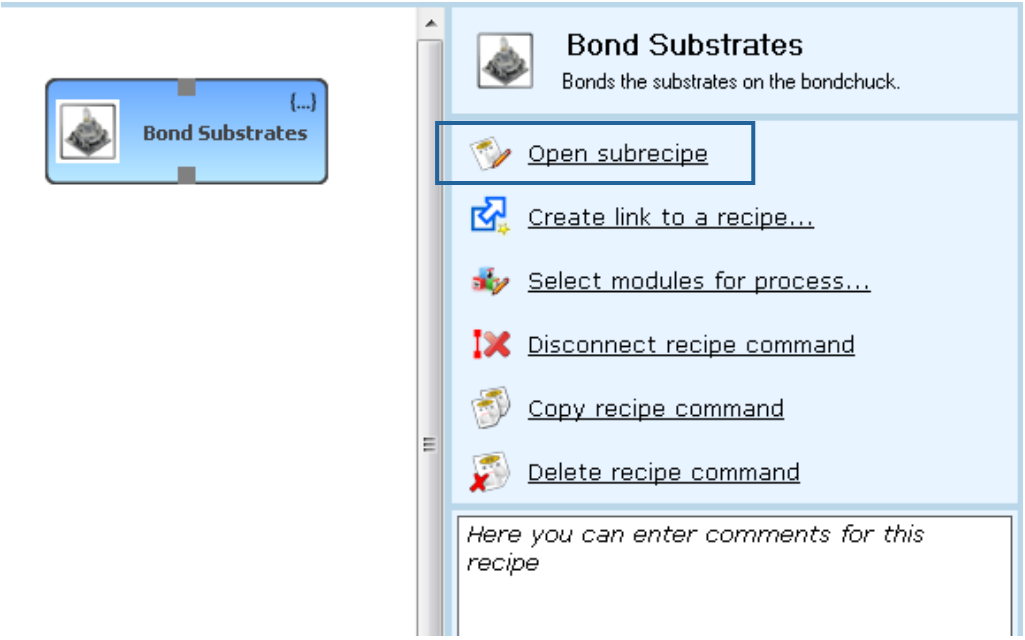
4.2 Recipes

The recipe defines all necessary parameters for processing substrates (e.g. temperature, pressure, time etc.)

In addition to the **Recipe Overview**, a separate editor (sequence recipe editor) is available for the bond chamber recipe on all systems equipped with wafer bonding modules.

In the **Recipe Overview**, select the recipe step **Bond Substrates** by clicking it. The blue color indicates that it is selected. Click **Open subrecipe** to open the sequence recipe editor for **Bond Substrates**.



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Sequence Recipe Editor

The sequence recipe **Bond Substrates** describes all parameters necessary for processing a substrate in the bond chamber.

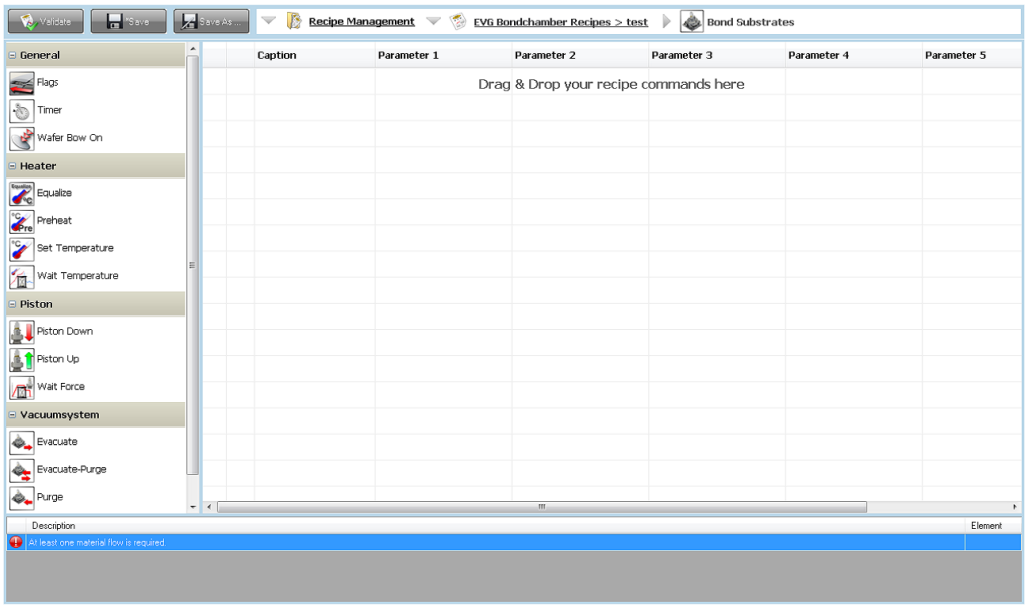

Figure 19 - Sequence Recipe Editor

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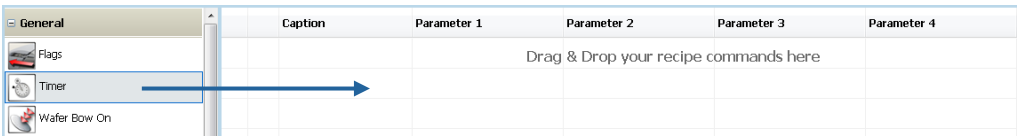
4.2.1 Edit Bond Substrates Recipe

1) To create a new recipe step, drag and drop it to a blank line:



2) A new window will be opened where all parameters of the recipe step can be set:

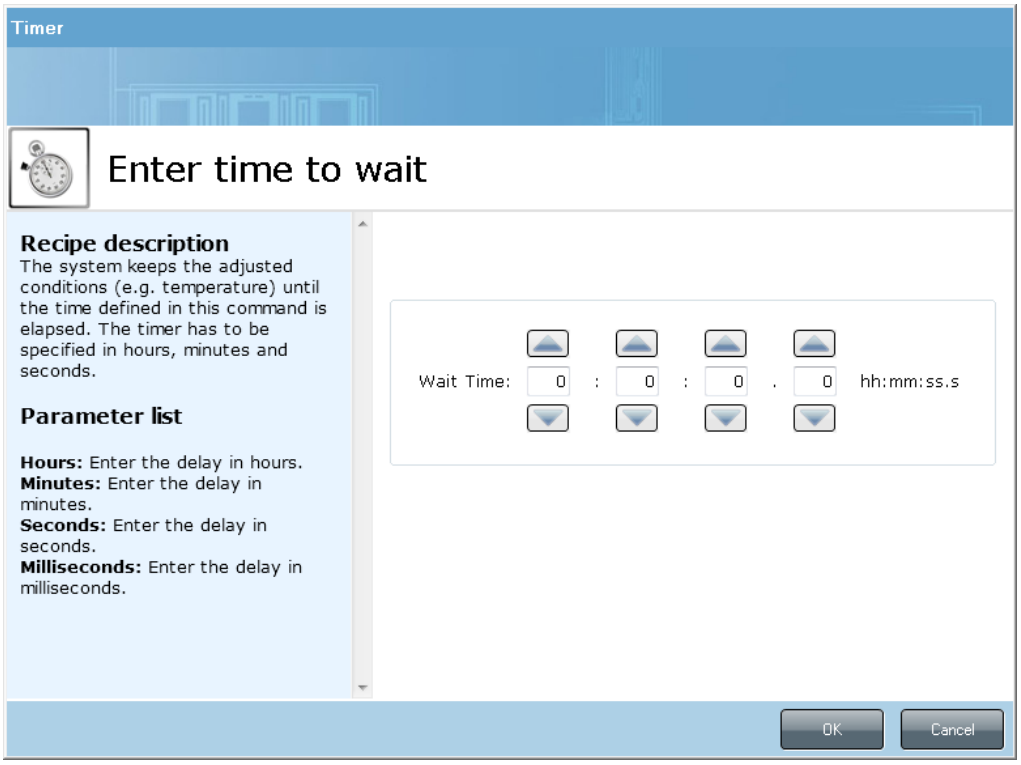

Timer
Enter time to wait
Recipe description
The system keeps the adjusted conditions (e.g. temperature) until the time defined in this command is elapsed. The timer has to be specified in hours, minutes and seconds.
Parameter list
Hours: Enter the delay in hours.
Minutes: Enter the delay in minutes.
Seconds: Enter the delay in seconds.
Milliseconds: Enter the delay in milliseconds.
Wait Time: 0 : 0 : 0 . 0 hh:mm:ss.s
OK
Cancel

Figure 20 - Recipe Step Parameters

3) Click **OK** after entering all settings. The recipe step will be inserted in the recipe (double-click the step to open the settings window if necessary):

Note: Refer to chapter 4.3 Recipe Steps for a detailed description of all recipe parameters.

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4.2.1.1 Move Recipe Step

1) Drag and drop a recipe step to the desired position. In the following example recipe step 1 is moved between recipe step 2 and 3:

			Caption	Parameter 1
A	1		Timer	Timer: 0:00:08.0 hh:mm:ss.s
B	2		Timer	Timer: 0:00:16.0 hh:mm:ss.s
C	3		Timer	Timer: 0:00:24.0 hh:mm:ss.s

Figure 21 – Drag and Drop

2) After moving the order of the recipe steps would be:

			Caption	Parameter 1
B	1		Timer	Timer: 0:00:16.0 hh:mm:ss.s
A	2		Timer	Timer: 0:00:08.0 hh:mm:ss.s
C	3		Timer	Timer: 0:00:24.0 hh:mm:ss.s

Figure 22 - Drag and Drop

4.2.1.2 Recipe Step Context Menu

Right-click a recipe step to open its context menu to find additional commands (e.g. delete selected recipe step):

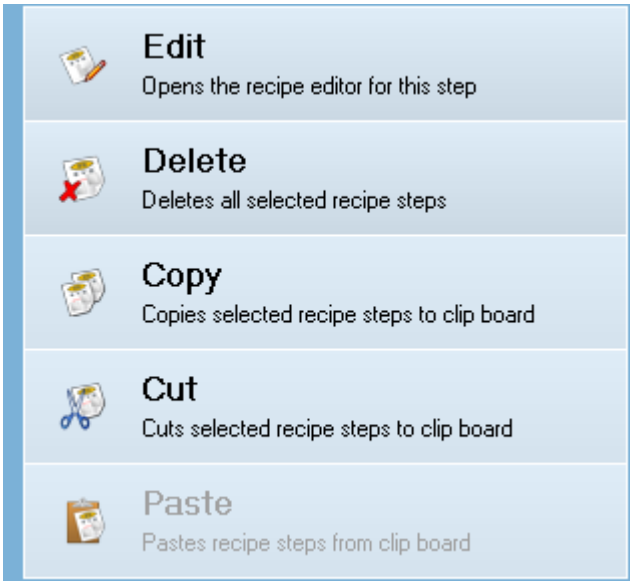

Figure 23 – Recipe Step Context Menu

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4.3 Recipe Steps

This chapter lists all recipe steps available for the bond chamber.

Note: Available recipe steps depend on system configuration.

4.3.1	Heater	4.3.4	Piston
4.3.1.1	Set Temperature	4.3.4.1	Piston Down
4.3.1.2	Wait Temperature	4.3.4.2	Piston Up
4.3.1.3	Preheat	4.3.4.3	Wait Force
4.3.1.4	Equalize	4.3.5	Voltage
4.3.2	Vacuumsystem	4.3.5.1	Set Voltage
4.3.2.1	Evacuate	4.3.5.2	Wait Current
4.3.2.2	Purge	4.3.5.3	Wait Charge
4.3.2.3	Evacuate-Purge	4.3.5.4	Check Resistance
4.3.2.4	Wait Pressure		
4.3.2.5	Purge Clean		
4.3.3	General		
4.3.3.1	Flags		
4.3.3.2	Wafer Bow On		
4.3.3.3	Timer		
4.3.3.4	Monitoring		

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4.3.1 Heater

Top and bottom heaters are used to reach a certain temperature in the bond chamber necessary for wafer bonding. Therefore the heater will heat or cool the bond chuck carrying the substrates.

Important: Heater commands are also used for cooling (by setting it to lower temperatures)!

4.3.1.1 Set Temperature

The set temperature command is used to reach a certain temperature by heating or cooling the top heater and / or the bottom heater.

The ramp rate defines how fast the heaters should ramp up to the target temperature.

To define different heat up (or cooling) procedures for top and bottom heater, the “Set Temperature” command has to be inserted two times (one for top and one for bottom heater).

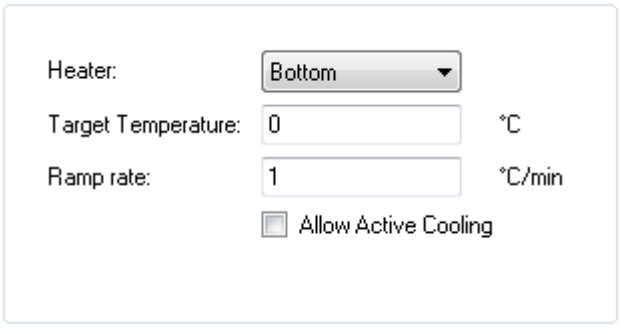

Figure 24 - Set Temperatures

Value	Description
Heater Target	Select the target heater.
Setpoint	Enter the temperature setpoint.
Gradient	Specify a heat up ramp.
Active Cooling	Select if active cooling should be activated when the specified target temperature is lower than the current temperature.
maximum Ramp	Use maximum ramp when cooling.

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4.3.1.2 Wait Temperature

With the wait temperature command, the system waits until the specified temperature is reached (on top and/or bottom heater).

According to the process command before, the system will heat or cool.

Therefore the temperature will pass the defined temperature upwards (higher than) or downwards (lower than).

The Timeout defines the maximum allowed wait time until the system stops the process and a timeout error message is displayed.

It is recommended to use the Timeout feature only in well-known and often used processes. The command is not useful for R&D processes as long as parameters are changed often. The risk that the system stops the process because of a wrong Timeout is high.

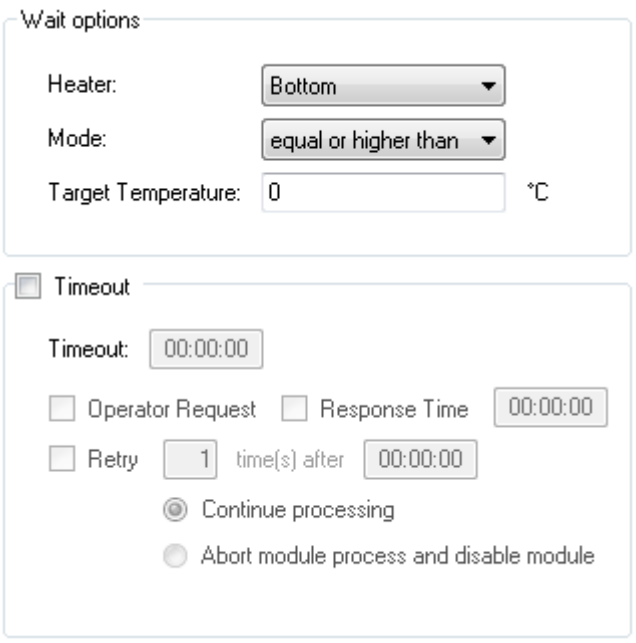

Figure 25 - Wait Temperature

Value	Description
Heater Target	Select the target heater.
Mode	Enter the wait mode.
Temperature	Enter the target temperature.
Timeout	Activate timeout.
Deadline	Enter a timeout value. It defines the maximum allowed wait time for the heater temperature. It will be reached until the error recovery action is activated.
RecoveryAction	Choose the error recovery action.

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4.3.1.3 Preheat

The preheat command is used to set the pre conditioned temperature and tolerance range. The temperature of a heater which is exceeding the preheating temperature can be reduced if the cooling function is activated.

Note: “Preheat” command has to be used as first recipe step.

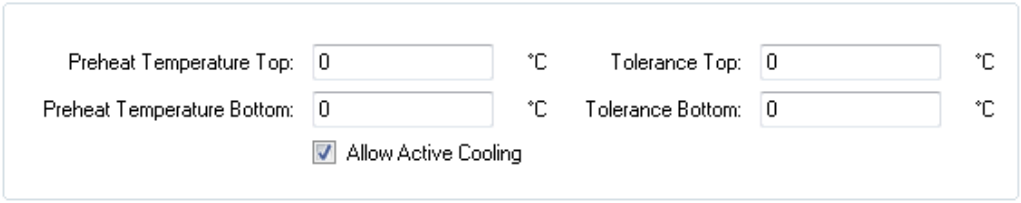

Figure 26 - Preheat

Value	Description
Preheat Temperature Top	Enter the top heater target temperature.
Tolerance Top	Enter the top heater temperature tolerance.
Preheat Temperature Bottom	Enter the bottom heater target temperature.
Tolerance Bottom	Enter the bottom heater temperature tolerance.
Allow Active Cooling	Active cooling can be activated. Only in case of the specified target temperature is lower than the actual temperature.

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4.3.1.4 Equalize

With this recipe command the temperature of top and bottom heater can be equalized within a certain tolerance before heating.

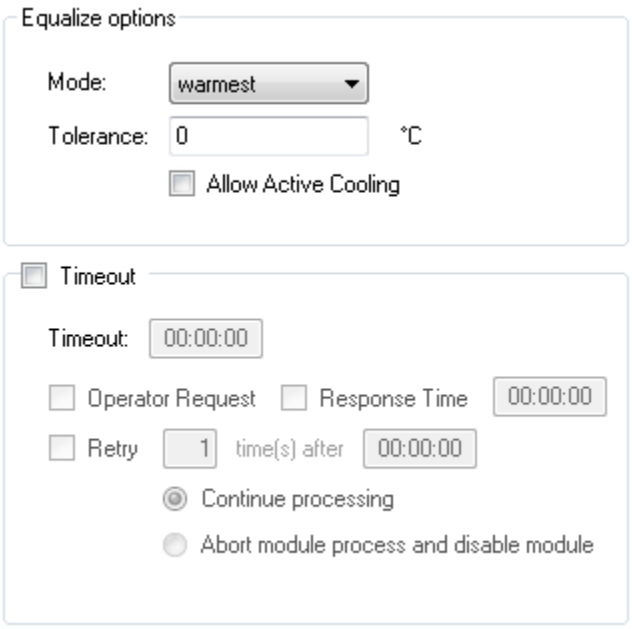

Figure 27 – Equalize Temperature

Value	Description
Mode	Enter the equalize mode.
Tolerance	Enter the equalize tolerance.
Allow Active Cooling	Select if active cooling should be activated during equalize temperatures.
Timeout	Activate timeout.
Deadline	Enter a timeout value. It defines the maximum allowed wait time for the heater temperature. It will be reached until the error recovery action is activated.
RecoveryAction	Choose the error recovery action.

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4.3.2 Vacuum System

Most wafer bonding processes require to be performed under vacuum.

The vacuum system recipe steps allow evacuating and/or purging the bond chamber or waiting until a certain vacuum is reached in the bond chamber.

4.3.2.1 Evacuate

With this recipe command the evacuation of the bond chamber can be started or stopped.

Evacuate Low:
Evacuates the chamber only with roughing pump and without switching to the Turbo Molecular Pump.

Evacuate High:
Evacuates the chamber with the roughing pump and switches to the Turbo Molecular Pump later on.

Evacuate Off:
Stop evacuation of the chamber (close valves).

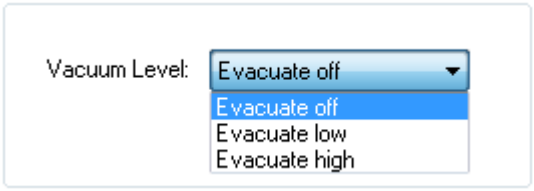

Figure 28 - Evacuate

Value	Description
Mode	Select the evacuate mode.
Setpoint	Enter a setpoint for the pressure in the chamber.

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4.3.2.2 Purge

With the purge command the chamber will be filled with different types of gases after evacuation.

Purge Off:
Closes all purge valves and traps the current atmosphere in the chamber.

Vent:
Fills the chamber with air (from clean room environment). This function will be activated automatically before the chamber lid opens. It ensures that the pressure inside and outside the bond chamber is equal.

Base Purge Line:

Flow can be controlled manually (manual valve).

Massflow controlled Purge Line:

Flow is controlled with the mass flow controller.

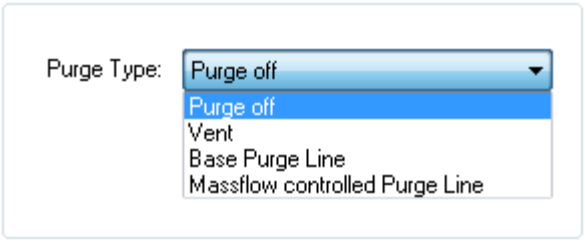

Figure 29 - Purge

Value	Description
Mode	Select the purge mode.
Purge Type	Select a purge type.
Setpoint	Enter a purge setpoint.
GasType	Select a purge gas type.

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4.3.2.3 Evacuate-Purge

With this recipe command pressure or flow can be controlled in the chamber.

It has to be defined in the recipe which parameter is fixed and which one can float.

There are two possibilities:

- It's either possible to keep the gas inlet flow constant (MFC) otherwise it has to be adjusted with the manual needle valve.
- Or keep the gas pressure in the chamber constant by changing the flow.

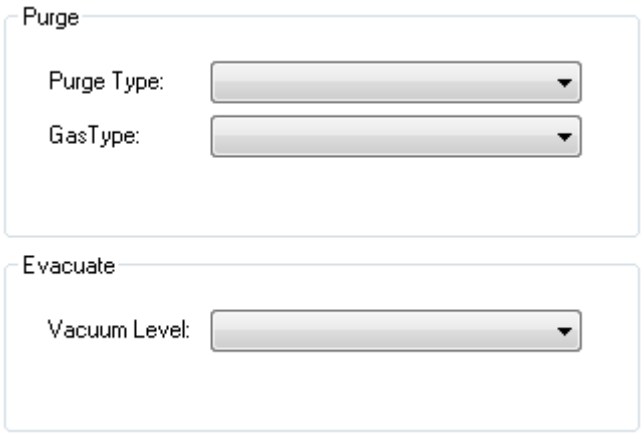

Figure 30 - Evacuate-Purge

Value	Description
Evacuate Mode	Select the evacuate mode.
Evacuate Setpoint	Enter a setpoint for the pressure in the chamber.
Purge Type	Select a purge type.
Purge Setpoint	Enter a purge setpoint.
GasType	Select a purge gas type.

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4.3.2.4 Wait Pressure

With the wait pressure command, the system waits until the specified vacuum in the chamber is reached.

Depending on the process command before, the system will check evacuation (lower than) or purging (higher than).

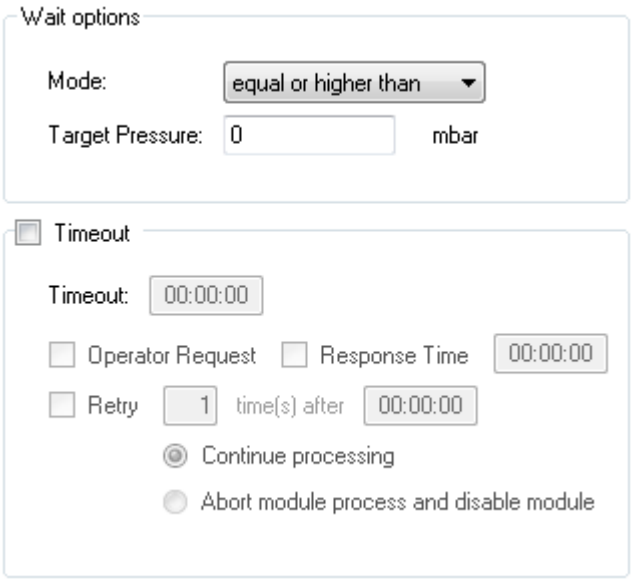

Figure 31 - Wait Pressure

Value	Description
Mode	Enter a wait mode.
Pressure	Enter a pressure target.
Timeout	Activate timeout
Deadline	Enter a timeout value. It defines the maximum allowed wait time for the pressure setpoint. It will be reached until the error recovery action will be activated.
RecoveryAction	Choose the error recovery action

It is recommended to use the Timeout feature only in well-known and often used processes. The command is not useable for R&D processes as long as parameters are changed often. The risk that the system stops the process because of a wrong Timeout is high otherwise.

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4.3.2.5 Purge Clean

Using this recipe step will activate the purge clean function.

		Caption	Parameter 1
1		Purge Clean	

No parameters necessary.

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4.3.3 General

4.3.3.1 Flags

With this recipe command the wafer separation flags between the top and bottom wafer can be pulled out (either all or certain ones).

For pulling the flags individually, the proper check box has to be activated and the command has to be inserted three times in the recipe (each time with a different check box activated).

Figure 32 - Flags

Value	Description
Flag 1	Select left flag.
Flag 2	Select middle flag.
Flag 3	Select right flag.
Flags In	Flag move.

4.3.3.2 Wafer Bow On

This recipe step is available if there is a wafer bow function equipped on the piston of the bond chamber.

Using this recipe step will activate the wafer bow function.

If activated, the ceramic pin will contact the wafers first when the piston moves down inside the bond chamber.

		Caption	Parameter 1
1		Wafer Bow	

No parameters necessary.

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4.3.3.3 Timer

With the timer command the system keeps the adjusted conditions (e.g. temperature) until the defined time is elapsed.

The timer has to be specified in hours, minutes, seconds and milliseconds.

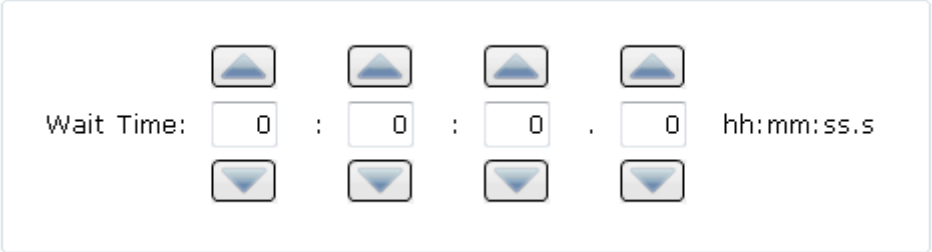

Figure 33 - Timer

Value	Description
Hours	Enter the delay in hours.
Minutes	Enter the delay in minutes.
Seconds	Enter the delay in seconds.
Milliseconds	Enter the delay in milliseconds.

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4.3.3.4 Monitoring

With this recipe command the module parameters can be observed. It also can be checked if all values were inside specified limits.

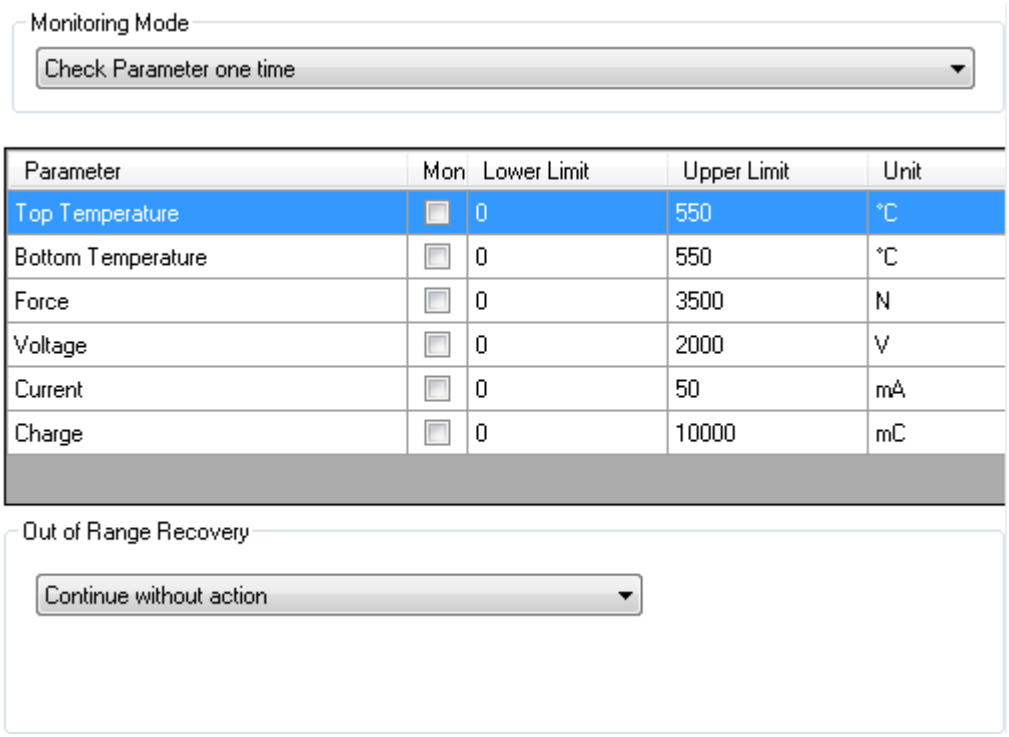

Figure 34 - Monitoring Parameters

Value	Description
Parameters	Select monitoring parameters.
Recovery	Choose the recovery action.
Mode	Select monitoring mode.

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4.3.4 Piston

The piston applies the pressure necessary for the process. The piston recipe steps allow the following:

- **Piston Down**: apply specified force to the substrate
- **Piston Up**: release force and move piston up
- **Wait Force**: apply force until a certain force is reached

4.3.4.1 Piston Down

With this recipe command the piston moves down and applies the specified force to the substrate.

The top side heater will be in contact with the substrate.

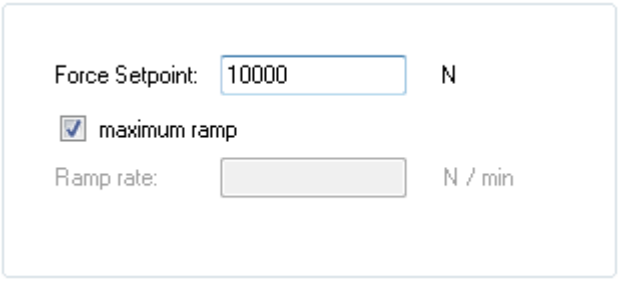

Figure 35 - Piston Down

Value	Description
Setpoint	Enter the piston force setpoint
Gradient	Enter the force gradient

4.3.4.2 Piston Up

Move piston back up to the start position (separated from the substrate).

		Caption	Parameter 1
1		Piston up	

No parameters necessary.

4.3.4.3 Wait Force

With the wait force command, the system waits until the specified force is reached.

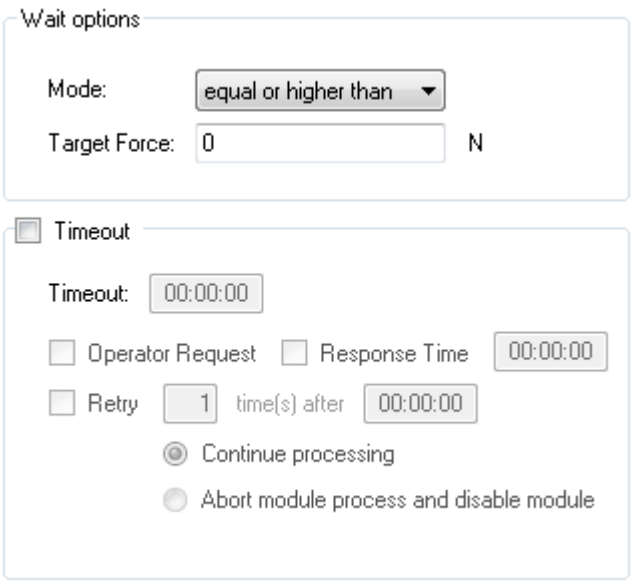

Figure 36 - Wait Force

Value	Description
Mode	Enter the wait mode
Force	Enter the target force.
Timeout	Activate timeout.
Deadline	Enter a timeout value. It defines the maximum allowed wait time for the piston force. It will be reached until the error recovery action is activated.
RecoveryAction	Choose the error recovery action.

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4.3.5 Voltage

The following recipe steps are available if the system is equipped with a voltage system (needed for anodic bonding processes).

The voltage recipe commands allow:

- Set Voltage: Enables or disables anodic bonding.
- Wait Current: Applies voltage until set current is reached.
- Wait Charge: Makes sure that all the bonded substrates got exactly the same amount of charge.

4.3.5.1 Set Voltage

With the set voltage command anodic bonding can be enabled or disabled.

Therefore are used these parameters:

- specified polarity
- voltage setpoint
- current setpoint

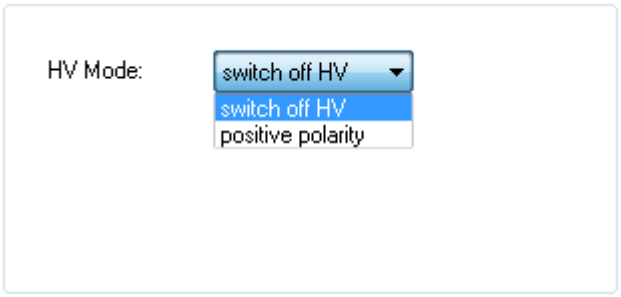

Figure 37 - Set Voltage

Value	Description
Polarity	Select a polarity mode. It defines which polarity the part on the topside of the bonder should have (attached to high voltage connection).
Voltage Setpoint	Enter the voltage setpoint.
Gradient	Enter the voltage gradient.
Current Setpoint	Enter the current setpoint.

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4.3.5.2 Wait Current

With the wait current command the system will check if the current passes the limit downwards (lower than) or upwards (higher than), according to the defined value in the field “Target Current”.

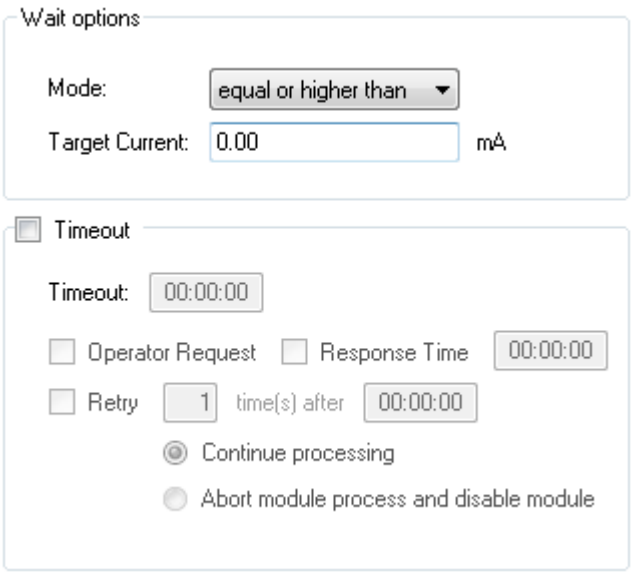

Figure 38 - Wait Current

Value	Description
Mode	Enter the wait mode.
Current	Enter the target current.
Timeout	Activate timeout.
Deadline	Enter a timeout value. It defines the maximum allowed wait time for the current setpoint. It will be reached until the error recovery action is activated.
RecoveryAction	Choose the error recovery action.

It is recommended to use the Timeout feature only in well-known and often used processes. The command is not useful for R&D processes as long as parameters are changed often. The risk that the system stops the process because of a wrong Timeout is high.

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4.3.5.3 Wait Charge

With this recipe command the bond system is accumulating the charge created during the time when voltage is applied.

The Wait Charge command allows that all bonded substrates got exactly the same amount of charge.

The charge has to be inserted in mC (Milli Coulomb).

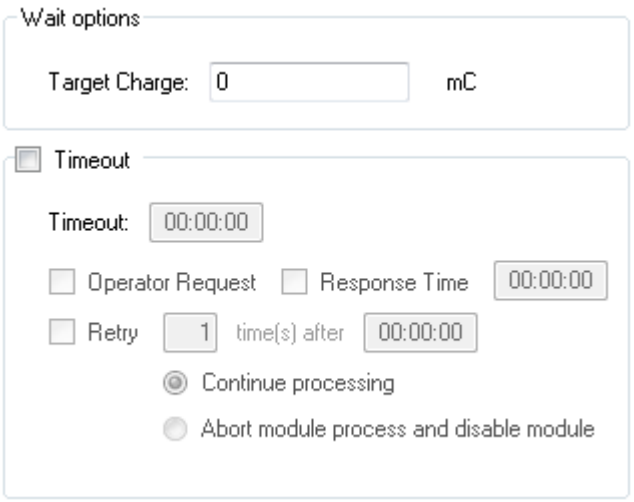

Figure 39 - Wait Charge

Value	Description
Charge	Enter the target charge.
Timeout	Activate timeout.
Deadline	Enter a timeout value. It defines the maximum allowed wait time for the charge setpoint. It will be reached until the error recovery action is activated.
RecoveryAction	Choose the error recovery action.

It is recommended to use the Timeout feature only in well-known and often used processes. The command is not useable for R&D processes as long as parameters are changed often. The risk that the system stops the process because of a wrong Timeout is high.

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4.3.5.4 Check Resistance

With the check resistance command the substrate-stack resistance can be checked. If it is necessary the burn function can be activated.

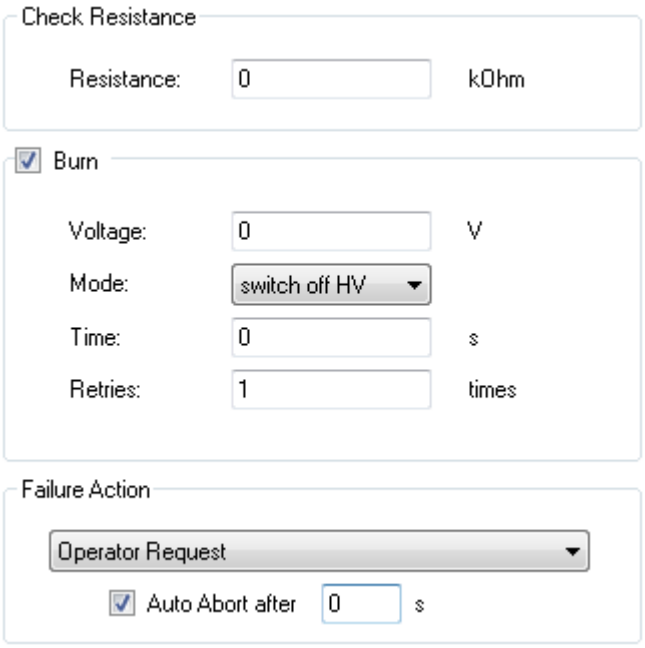

Figure 40

Value	Description
Resistance	Enter the resistance limit.
Voltage	Enter voltage limit for burn function.
Mode	Select polarity for burn function.
Time	Enter burn duration.
Retries	Enter number of burn retries.
Failure Action	Define what should happen after an error.
Auto Abort after	Wait time for operator request.

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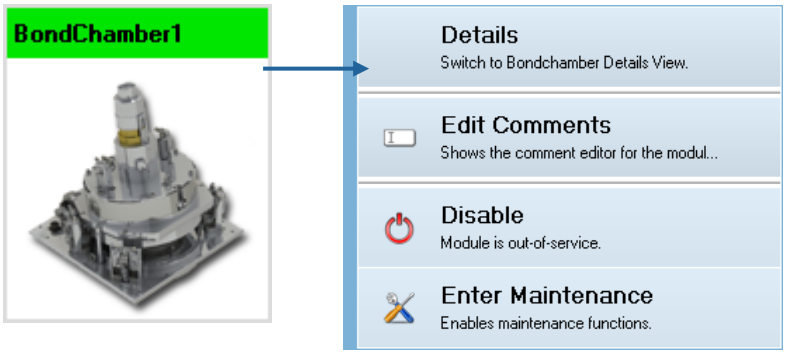
5 High Level Menu

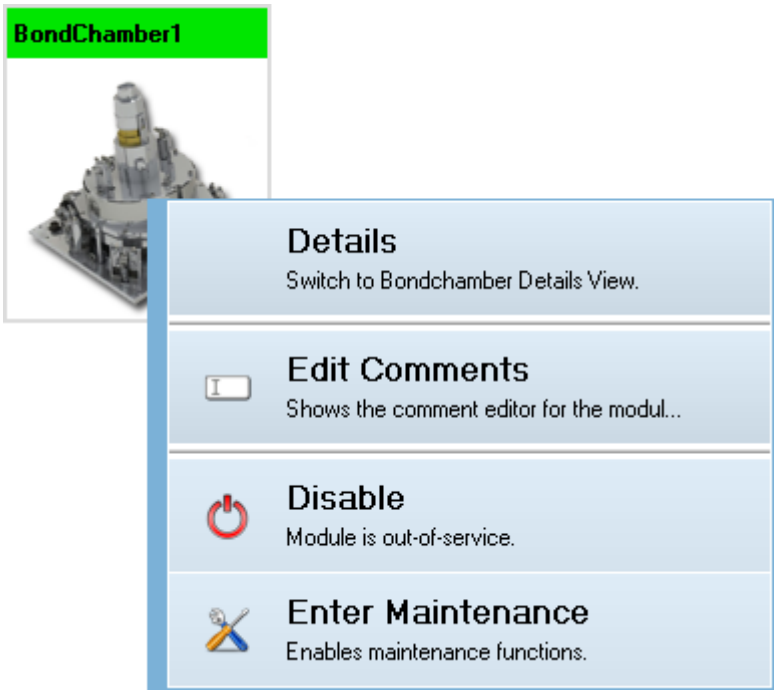
Click the bond module icon to open the context menu (high level):



Details	Go to module details window (Modules – Bond Chamber)
Add Comment	Add or modify the text comment of the module.
Disable	Disable the module.
Enter Maintenance	Enter maintenance mode to find further high level commands (see below).

It is required to enter maintenance mode of a module to be able to execute certain module commands.

Click the module and select **Enter Maintenance**.



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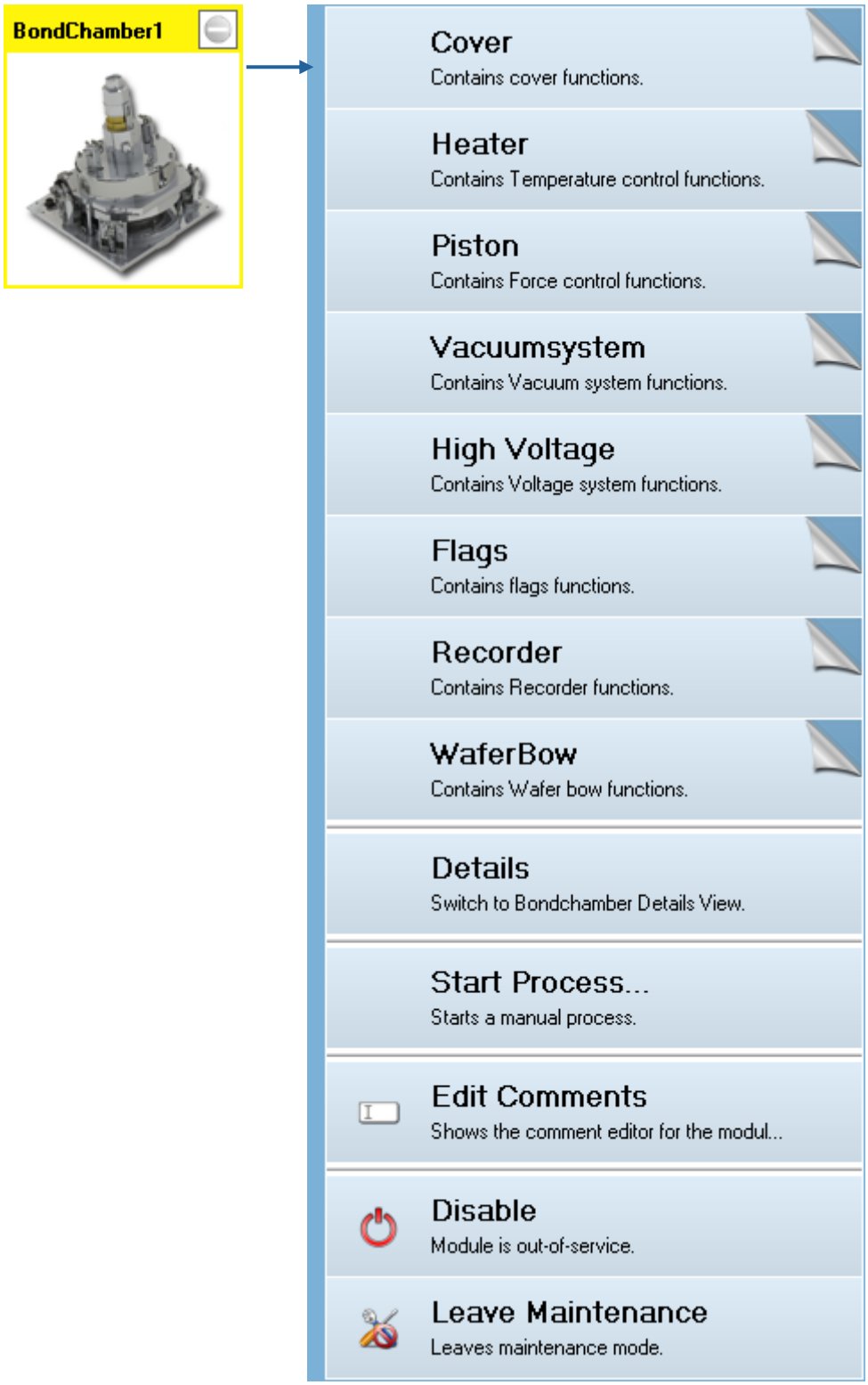
The module mode is indicated by its border color. Click the module to find maintenance mode high level commands.



Note: Available context menu items may vary depending on system configuration!

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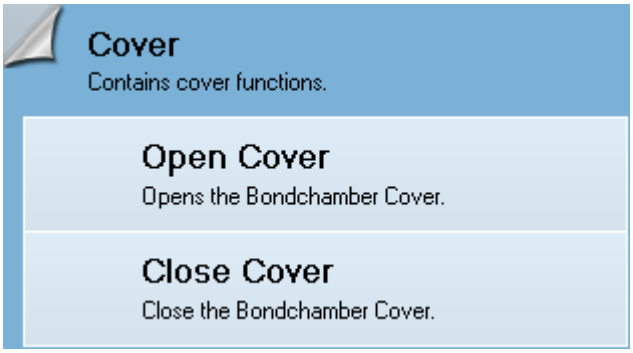
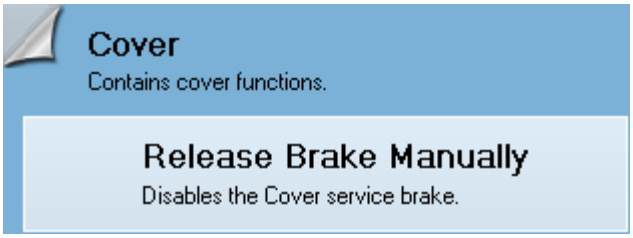
5.1 Cover

5.1.1 Automatic Cover



Open Cover	Open the bond module cover.
Close Cover	Close the bond module cover.

5.1.2 IS Cover

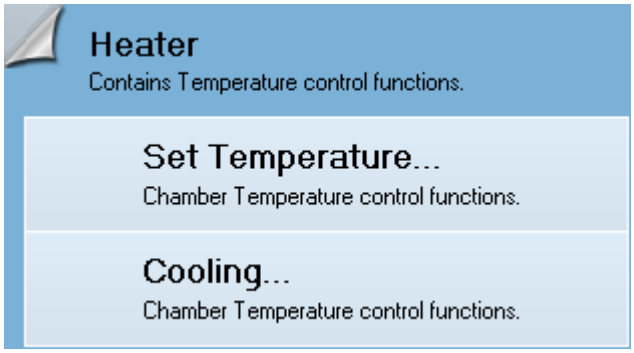


Release Brake Manually	Disable the cover service brake.

5.1.3 Manual Cover

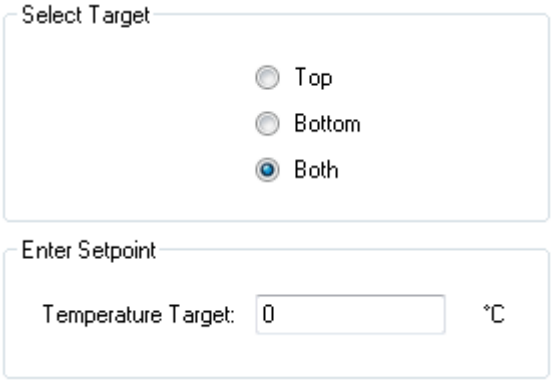
There is no high level function available.

5.2 Heater



5.2.1 Set Temperature

Set the temperature of a selected heater to apply heating.



1) Choose “Top”, “Bottom” or “Both” heaters.
2) Enter the setpoint in °C.
3) Click on OK to confirm.

5.2.1.1 Cooling

Set the temperature of a selected heater to apply cooling.

1) Select if cooling should be done on “Top”, “Bottom” or “Both”.
2) Select if the cooling should be switched “ON” or “OFF”.
3) Click on OK to confirm.

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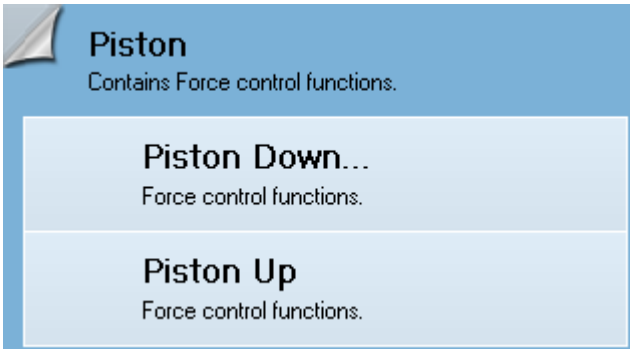
5.3 Piston



5.3.1 Piston Down

Move the piston down.

1) Enter the setpoint for the piston down force in N (see restrictions displayed in the tooltip).
2) Click on to confirm.

5.3.2 Piston Up

Move the piston up (no settings are required).

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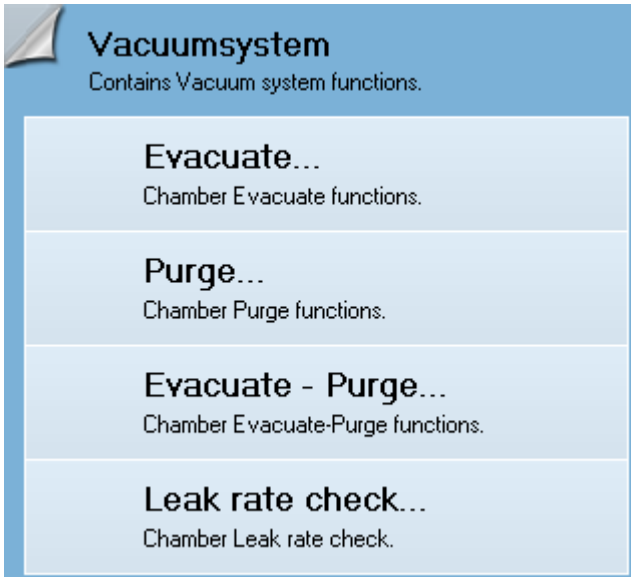
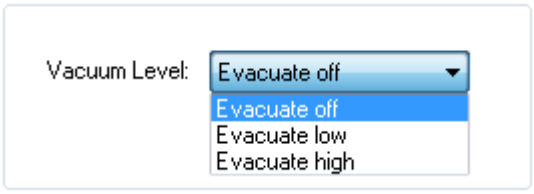
5.4 Vacuum System



5.4.1 Evacuate

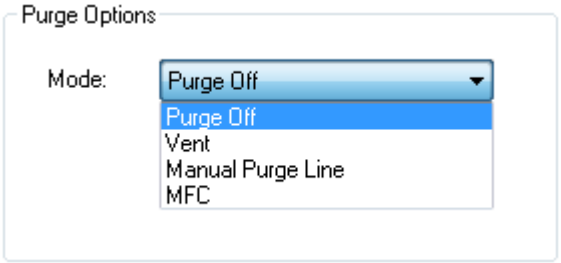
Evacuate the bond chamber.



1) Select the mode (“Evacuate off”/“Evacuate low”/”Evacuate high”).
2) Click on OK to confirm.

5.4.2 Purge

Purge the bond chamber.



1) Select the mode (“Purge Off”/“Vent”/”Base Purge Line”/”Manual Purge Line”/”MFC”).
2) Click on OK to confirm.

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5.4.3 Evacuate – Purge

Evacuate – Purge the bond chamber.

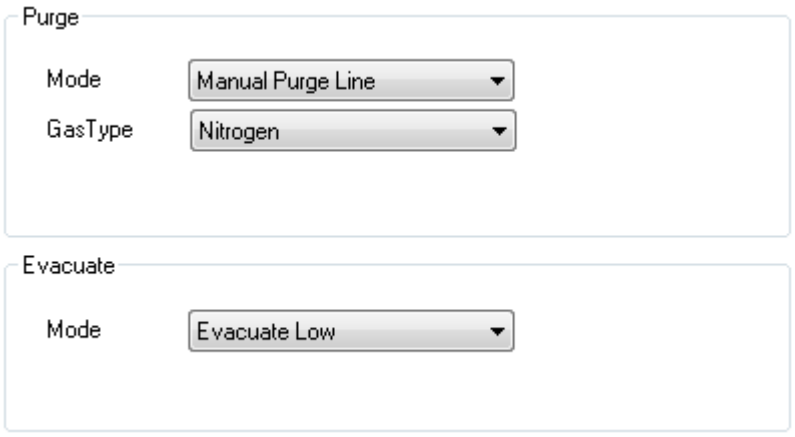

Figure 41

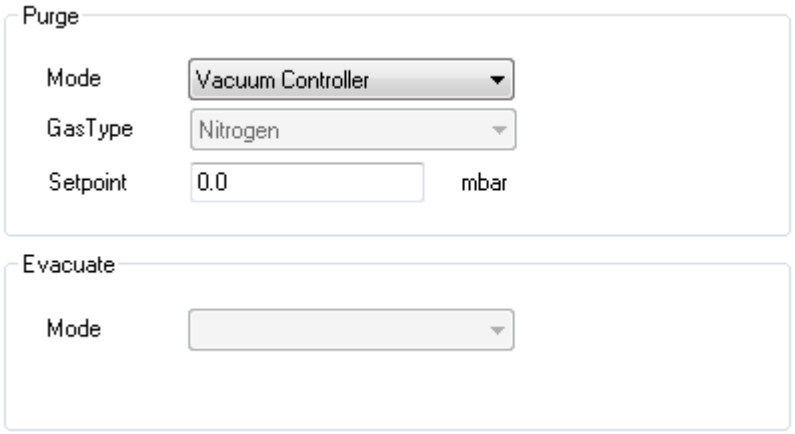

Figure 42

1) Select the purge mode (“Base Purge Line”/“Manual Purge Line”/”MFC”/”Vacuum Controller”).
2) Select the gas type (Nitrogen/Xenon).
3) Enter a setpoint for the purge function in mbar (if available, Figure 39).
4) Select the evacuate mode (Evacuate Low)
5) Click on OK to confirm.

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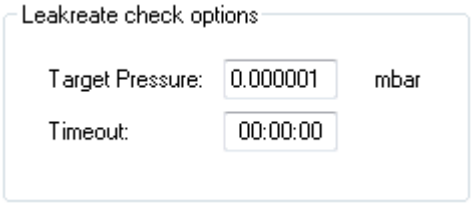
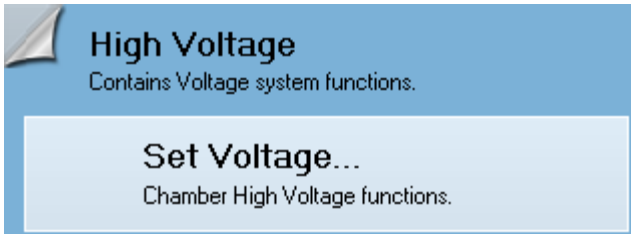
5.4.4 Leak Rate Check

Check the leak rate of the bond chamber.

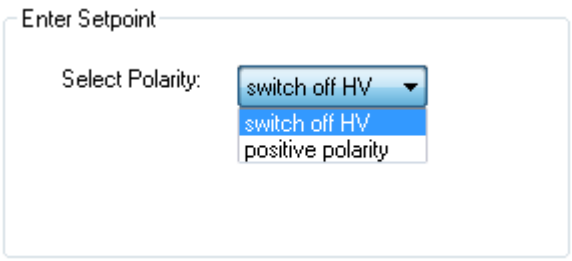


1) Enter a target pressure for the leak rate check.
2) Enter a timeout value.
3) Click on OK to confirm.

5.5 High Voltage



5.5.1 Set Voltage



1) Select the polarity (“switch off HV”/”positive polarity”).
2) Click on OK to confirm.

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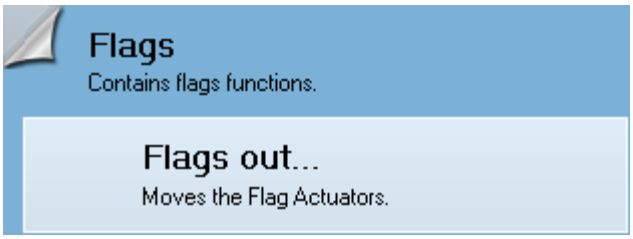
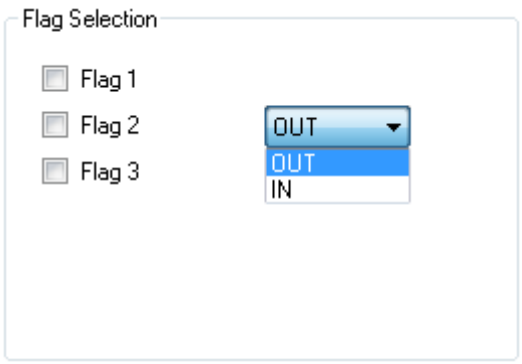
5.6 Flags



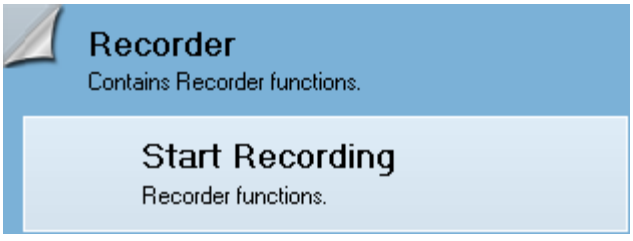
5.6.1 Flags Out

Move the flags out (or in).



1) Select the flags that should be moved.
2) Select if the flags should be moved “OUT” or “IN”.
3) Click on to confirm.

5.7 Recorder



5.7.1 Start Recording

Start (or stop) recording (recorder software).

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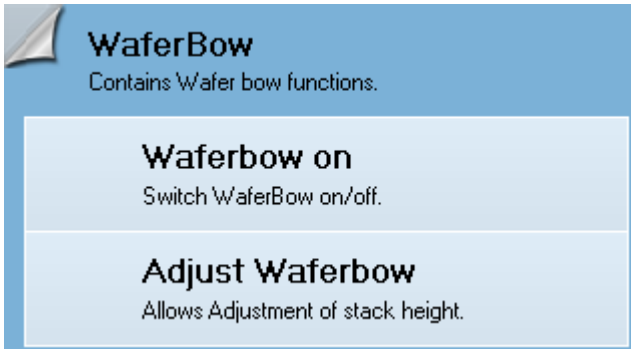
5.8 Wafer Bow



5.8.1 Waferbow On

Activate wafer bow function.

5.8.2 Adjust Waferbow

Adjust the wafer bow screw according to the substrate stack height (Figure 43).

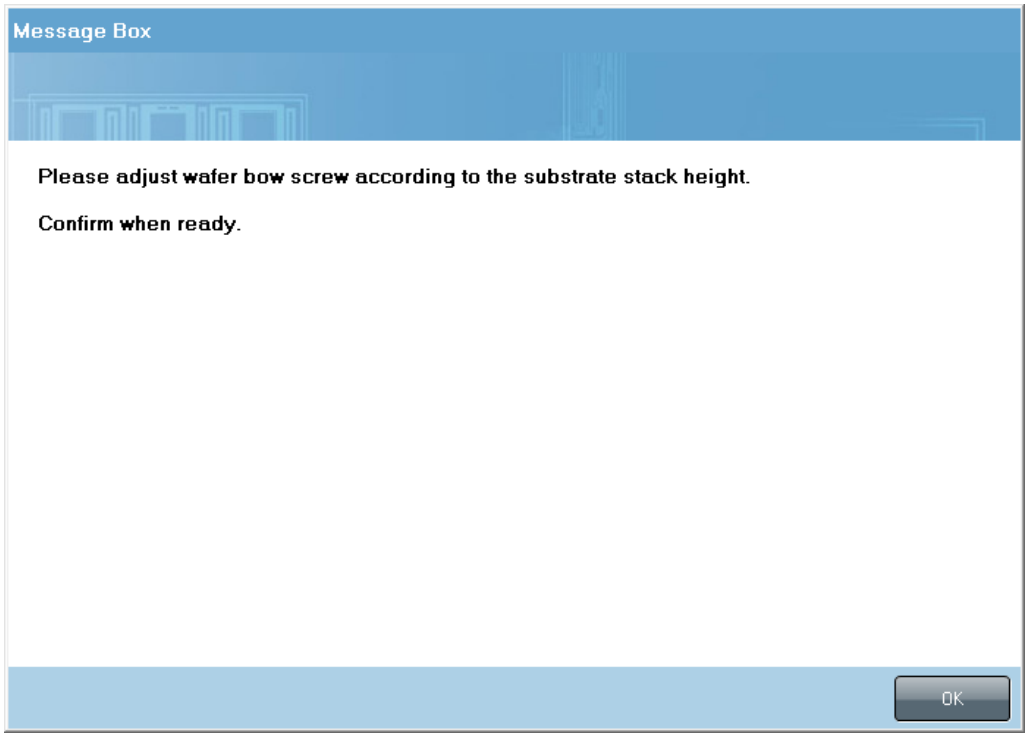


Figure 43

1) Adjust the wafer bow screw.
2) Click on

to confirm when done.

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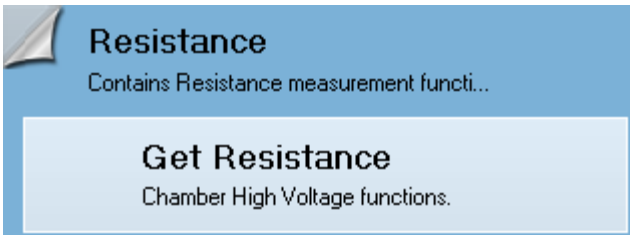
5.9 Resistance



5.9.1 Get Resistance

Display the measured resistance.

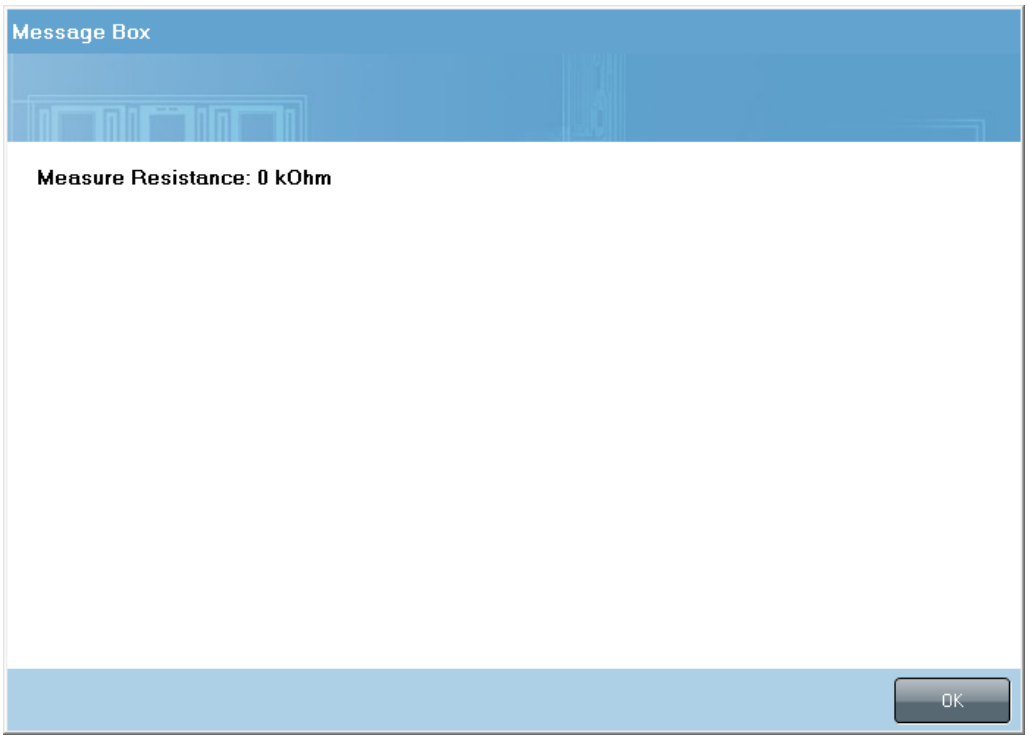


Figure 44

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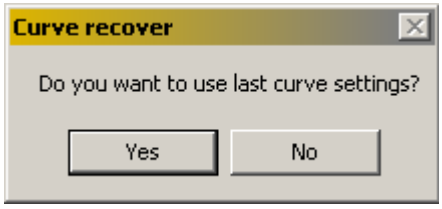
6 Recorder Software

6.1 General

This software allows to record and save all process parameters.

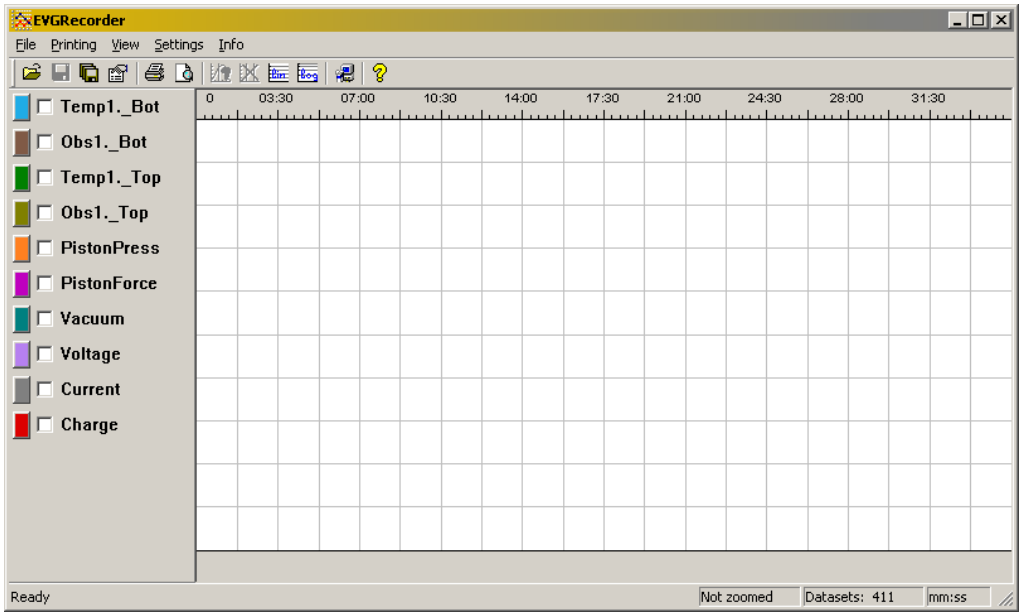
After opening the Recorder-Program following window appears:



Press “Yes” to show the view as last used.

Press “No” to adjust the settings new.

The Recorder looks like this:



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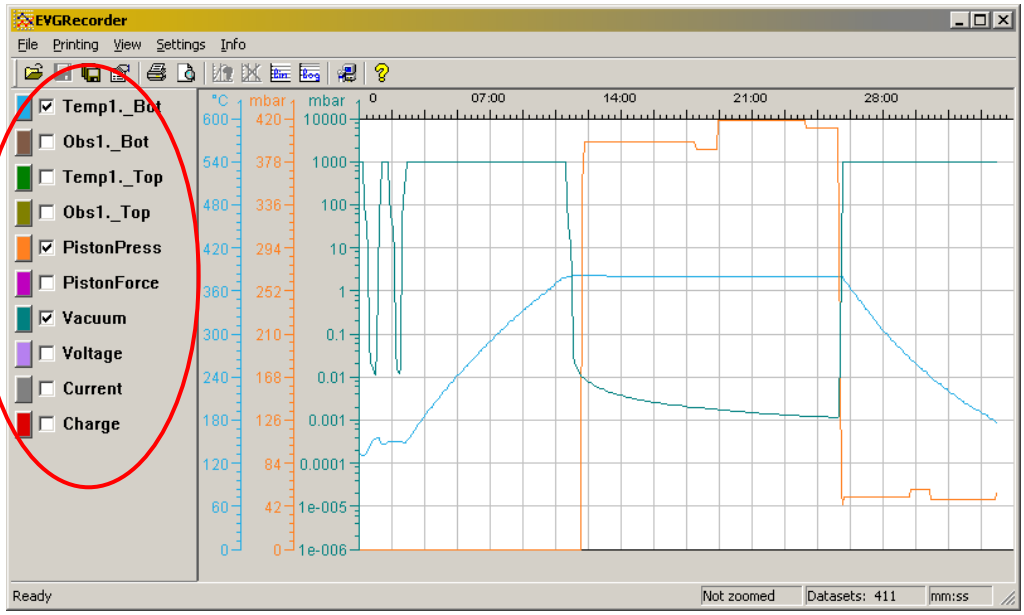
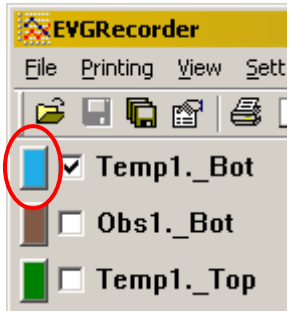
6.2 Choose Parameters



Choose the parameters which should be shown in the left scale. For each chosen parameter a separate scale is shown (in the same colour as the parameter line).

6.2.1 Settings for Graphs and Scales



Press the **right** mouse button on the colour field to adjust the colour for the graphs and the scale of the chosen value. Choose a colour and press “OK” to confirm the new colour or press “Cancel” to cancel the colour adjustment.

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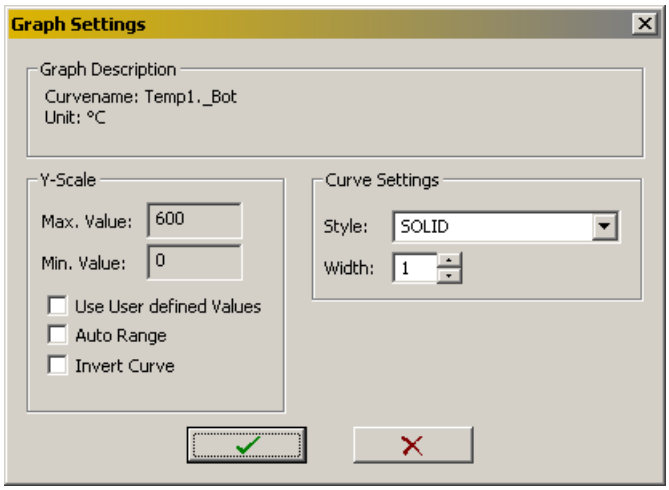
Press the **left** mouse button on the colour field for more “Graph Settigs” of the chosen value. Following window will be shown:



Find general information of the chosen graph in the field **“Graph Description”**.

Field **“Y-Scale”**:

“Auto Range”: the software searches automatically the best view by using the available values for the chosen graph.

Use “User defined Values” and enter values for “Max. Value” and “Min Value” in the defined fields.

Choose “Invert Curve” to invert the chosen graph.

In the field **“Curve Settings”** it is possible to choose the style and the width of the chosen graph.

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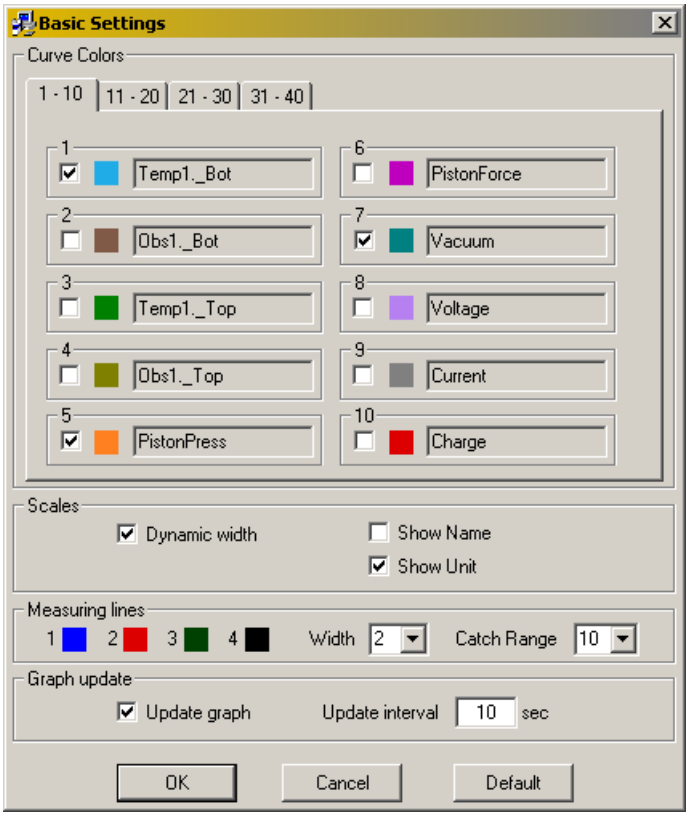
Use “Settings” – “Basic Settings” or press “Ctrl” + “S” on the keyboard to adjust the basic settings for graphs, scales, measuring lines and graph update.



Measuring Lines: Adjust the colors and the width of the lines (find more in item “Measure Bars”) as they should be shown. Catch Range: the mouse pointer catches the measuring line x Pixel early as the line is shown. Enter a value (for x) in the field “Catch Range”.

Graph Update: this is an automatic update of the measuring point of the curves. Update Interval: a value for the time in seconds for interval of updating the graph.

Note: This has no importance to updating the measuring points!

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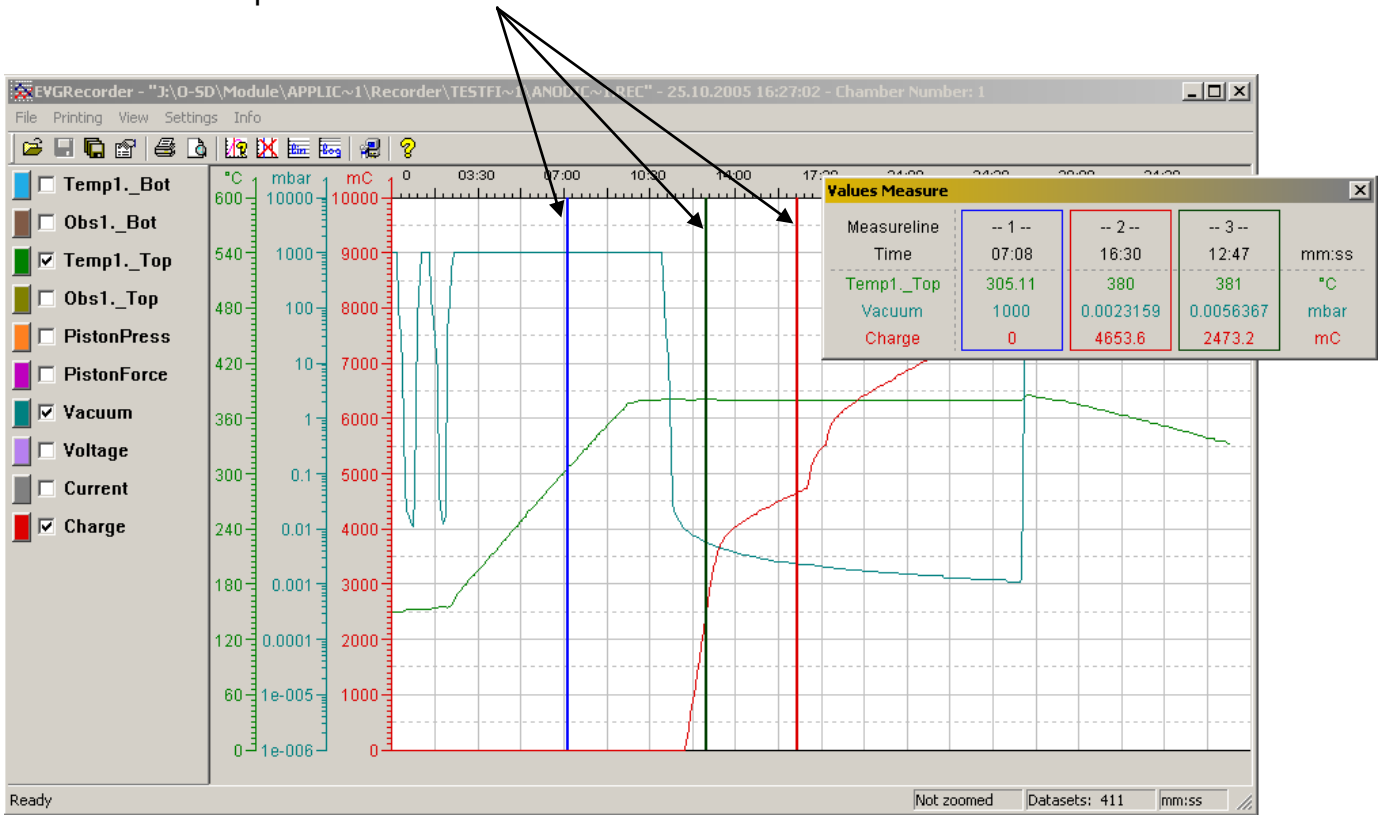
6.3 Measure Bars

With the measure bar it is possible to find exact values of the visible graphs.

6.3.1 Show Measure Bar

Press „Strg“ + left mouse button or „Shift“ + left mouse button to show a measure bar. (Place the mouse pointer before pressing the left mouse button where the measure bar should appear.)

Up to four measure bars can be shown.



Find the specific values for all measure lines in the window “Values Measure”. If this window does not appear use the button “Toggle Measure Window” in the toolbar to open it.

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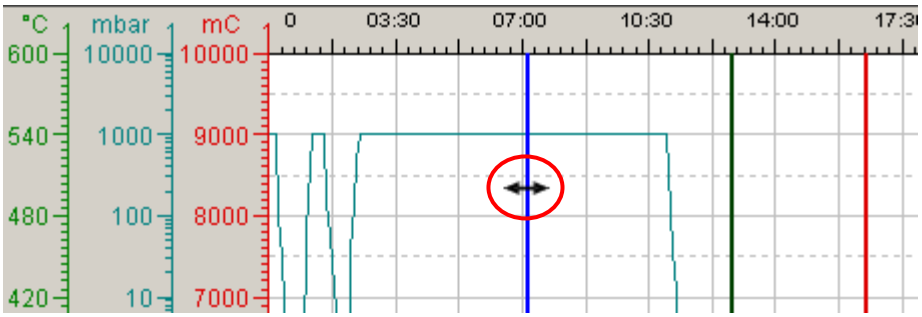
6.3.2 Move Measure Bar

Move the mouse over a measure bar. The mouse button will change into double arrow (as shown).



Use the left mouse button to move the measure bar.

6.3.3 Delete Measure Bar

Delete one measure bar:

Press “Strg” or “Shift” on the keyboard and point with the mouse on the measure bar which should be deleted and press the right mouse button.

Delete all measure bars:

Use the button “Delete Measure Bars” in the toolbar.

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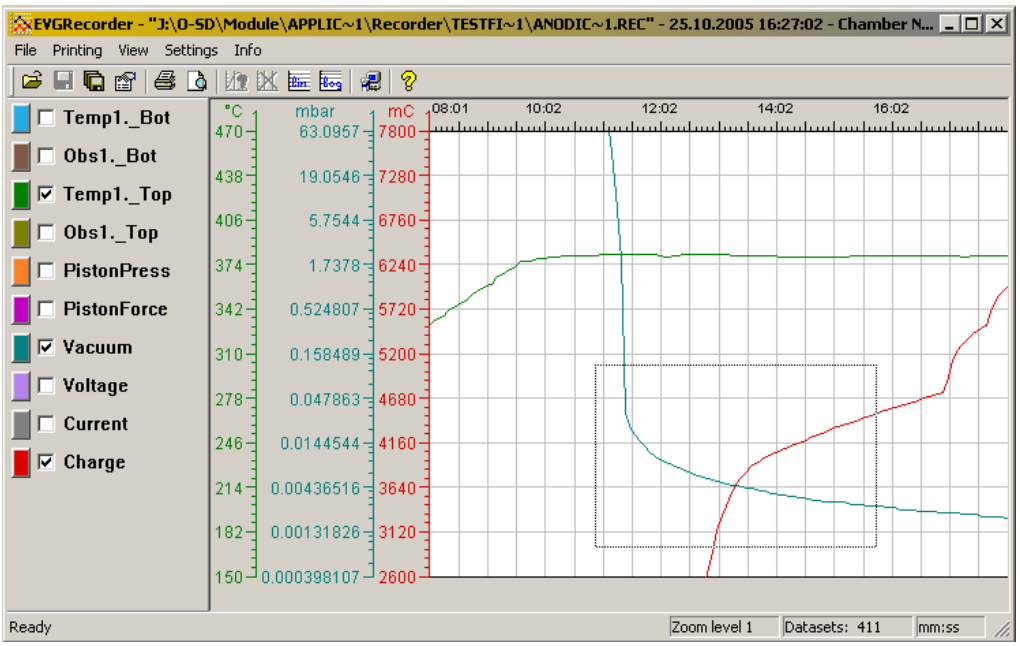
6.4 Zoom

Draw a rectangle over the part which should be zoomed with the mouse pointer:



There are four zoom- steps available.

Press the right mouse button to go back one zoom- step.

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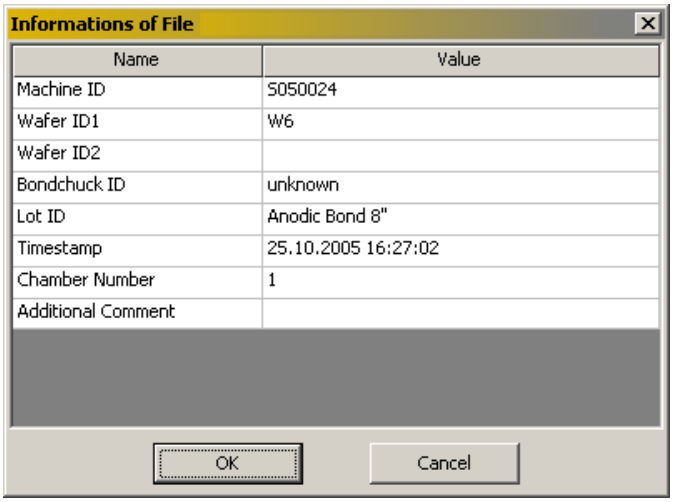
6.5 More functions of the recorder Software

6.5.1 Grids

Choose the view of the grids. Choose “Linear Grid” or “Logarithmic Grid” according to the shown graphs.

6.5.2 File Info

Press “File” / “File Info” or use button to open the window “File Info”.



Find all corresponding information of the current file in this window.

Add an additional comment if necessary. This comment will only be saved if save button will be pressed afterwards.

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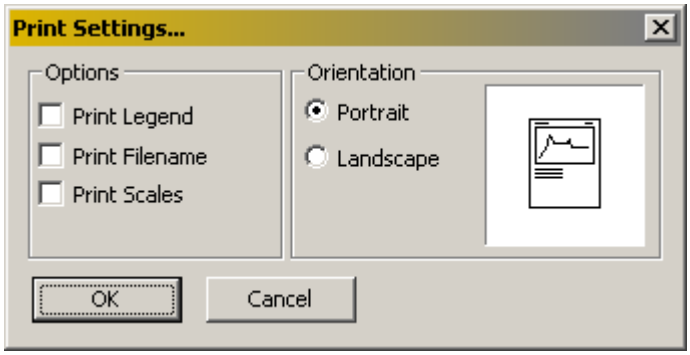
6.5.3 “Printing”

Find the buttons “Print”, “Print Preview” and “Print Setup” at menu “Printing” in the menu bar.

“Print Setup”: activate / deactivate printing the legend, the filename and the scales. Choose print orientation “Portrait” or “Landscape”.



“Print Preview”: Take a look at the print preview before printing the document.

“Print”: Print document.

6.5.4 “About Recorder”

Find information about the software- version and the registration (limited or unlimited) in the window “About EVGRecorder” (press “Info” / “About EVGRecorder” in the menu bar).

6.5.5 Save / Open

6.5.5.1 Open

Open an existing file via „File“ / “Open” or the button

6.5.5.2 Save

Save the current file via „File“ / “Save” or the button .

Save the current document with a new name via “File” / “Save As” or the button .

6.6 Activate the recorder software

The recorder software has to be activated by an EVG Engineer.

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History

Date	Modification	by
2011-11-18	First written	WAA
2013-08-14	Updated screenshots, recipe steps and high level menu	HBA

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State:	Released		Author:	WAA
File:	EVG_Framework-BondModule_EO_eng_2.3_rev_02.doc			
Created on:	2011-08-08		Printed on:	2013-10-24
Version:	2.0		Last revision	2011-11-18
Purpose:	Operation		Language:	EN

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Maximum Piston Force

Customer Support Documentation
EVG5xx

EV Group
E. Thallner GmbH
DI-Erich-Thallner-Straße 1
A-4782 St. Florian/Inn

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1 Maximum Piston Force 3

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1 Maximum Piston Force

The following table provides benchmark numbers for orientation what is possible with different pressure disc materials.

Warning: Bondchucks and pressure discs have to match each other. EV Group recommends using appropriated pressure discs and bondchucks.

Bonding of substrates which do not fit to the specified size of pressure disc and bondchuck results in lower max piston force, bending or breaking the pressure disc or substrate.

Note: Bond chucks and pressure discs have to be flat. Warpaged parts can cause breaking or warping.

The colored field shows the piston force in steady state condition (without any temperature change).

The white field shows the force applicable during the heating or cooling sequence. The values are based on standard Si-substrates according to SEMI standards. If more force is applied either substrate or pressure disc breakage (Quartz, Ceramic) may occur.

Bonder Size	**150mm**											
Pressure Disc for	**200mm**		**150mm**		**125mm**		**100mm**		**3in**		**2in**	
Stainl. St. /Ti			100kN	8kN	60kN	5kN	30kN	4kN	15kN	1,5kN	6kN	1kN
Quartz*			10kN	5kN	8kN	4kN	5kN	2kN	3kN	1kN	2kN	0,5kN
SiN			100kN	20kN	60kN	10kN	25kN	8kN	8kN	6kN	3kN	1kN

***) Quartz material is extremely sensitive to particles on the substrate surface. Take care that all surfaces which are in contact with the quartz during bonding are very clean.**

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History

Date	Modification	by
2010-03-18	First written	WAA
2011-10-05	Updated values with HP	WAA

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State:	Released		Author:	WAA
File:	EVG5xx_MaxPistonForce_DO_eng_02_150mm.doc			
Created on:	2005-07-18		Printed on:	2011-10-05
Version:	2.0		Last revision	2011-10-05
Purpose:	Operation		Language:	EN

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Preventive Maintenance Manual

Customer Support Documentation
EVG520

EV Group
E. Thallner GmbH
DI-Erich-Thallner-Straße 1
A-4782 St. Florian/Inn

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1 Note to the User

Installation, adjustment, programming and maintenance (except periodical maintenance described in the manual) may only be done by qualified EVG service engineers.

For further deliveries please check immediately after unpacking that the consignment confirms to the information given on the packing list.

Read and understand the operating and safety instructions before you operate the unit and follow them in all respects.

The equipment may only be operated by personal trained from EVG service engineers.

No liability will be accepted for personal injury no material damages in the event that damage or breakdowns occur as a result of failure to comply with these operating instructions; neither will any guarantees relating to repairs to or replacements of our products apply.

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2 Safety

- The equipment represents state-of-the-art technology and optimum operationally reliable. The user may however be exposed to hazards if it is used improperly or for other than its intended purpose!
- If the equipment is used for any other than its intended purpose, all liability and warranty claims will lapse!
- All unauthorized modifications and alterations affecting the safety are prohibited!
- The use of self-made tools is not allowed in any case.
- Any use by unauthorized personnel or careless handling may increase the potential danger.
- If the media support specified from EVG is not fulfilled, the operational function of the equipment is not guaranteed.

- Always wear gloves during operating with the system.

- Avoid any contact with any liquid used in the system
- UV- Safety glasses.

!! ATTENTION !!

Do not remove or change any safety facilities from the system.

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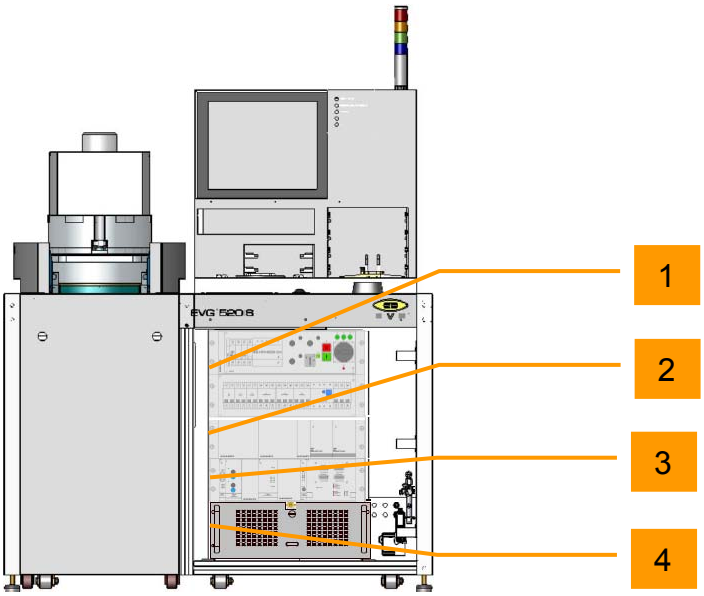
3 Daily Maintenance

3.1 Control Cabinet



EVG520IS front view

1	Mainswitch Rack
2	Power Supply Rack
3	Electronic Bond Module Rack
4	PC Equipment

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3.2 Main Pressure

The Main Pressure is permanently checked by the software. There must be an error message if the pressure drops below 5 bar.

Inspect the main pressure regulator (1) on the rear wall. The normal static operating pressure should be around 6-8 bar.

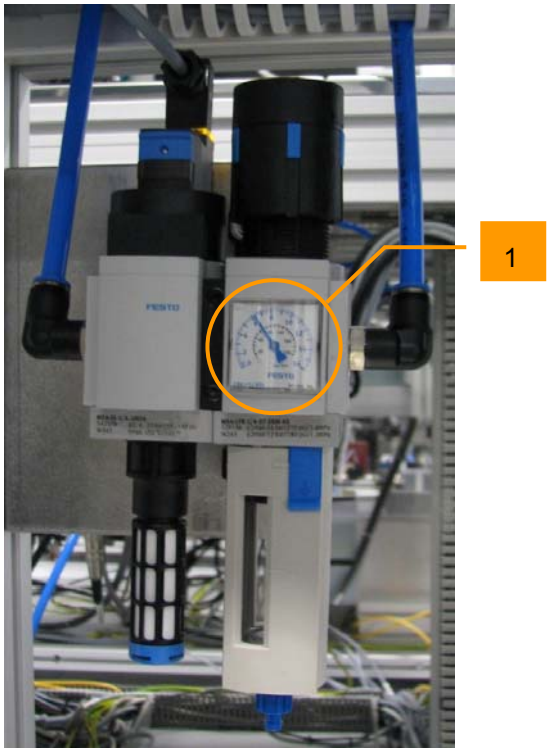

Figure 1 - Main Pressure Regulator

Weekly check the main pressure regulator and the filter for the presence of oil or water (see chapter “Weekly Maintenance”).

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3.3 Process Gases (Purge Gas)

The purge gas is not permanently checked by the software!

Check the purge gas pressure regulator(s) (1) and make sure that the adjusted value is correct.

Location of the purge gas pressure regulator:

Open the door to get access to the purge gas pressure regulator.

Figure 2 - Purge Gas Regulator (EVG520IS)

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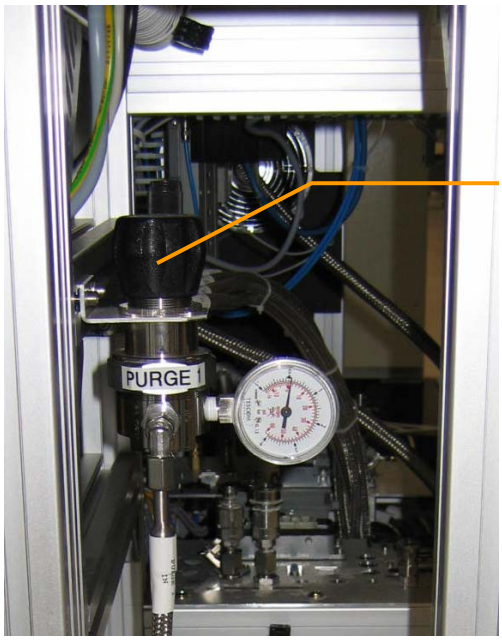

Figure 3 - Purge Gas Regulator

Range: 0-2 bar (8 inch system)

Range: 0-1,3 bar (12 inch system)

Make sure that purge gas pressure is sufficient, if adjustment is not possible and / or purging sequence takes longer than normally. An additional pressure gauge on the backside is recommended. Maximum input pressure: 10 bar

3.3.1 Allowed Gases

Inert gas – Precious gas
He – Helium gas
N2 – Nitrogen gas
Ar – Argon gas
Ne – Neon gas
Forming gas: 95% N2
5% H2

Warning: All other gases are not allowed to use! Do not use one of the following gases:

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Poisonous Gases

Flammable Gases

Oxidizer Gases

3.4 Bond Tools

Visually inspect the bond tool surface. There should be no deposits or scratches visible. Clean the bond tools with alcohol. Particularly the top and bottom surface of the bond chuck insert.

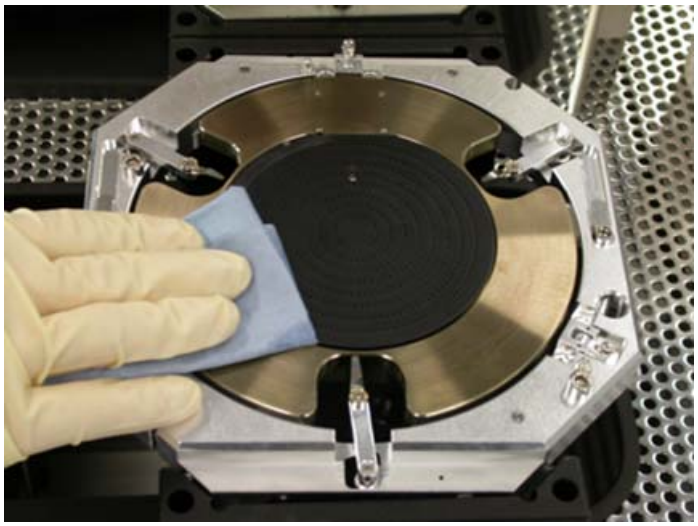

Figure 4 - Top Surface of the Bond Tool

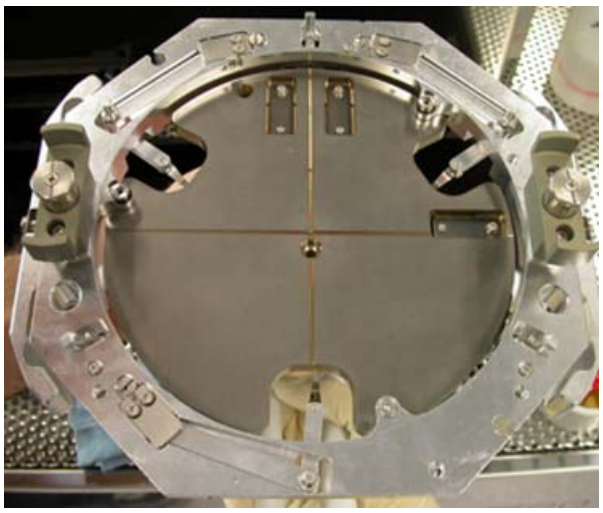

Figure 5 - Bottom Surface of the Bond Tool

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3.4.1 Bond Tool Insert

The bond tool insert should have the same thickness (8mm) all over the surface.

Required tools:

- Sliding caliper

- Wafer pieces with defined thickness (e.g. 500 µm)

a) Put the wafer pieces on the top and bottom side of the pressure insert. The bond tool frame is probably higher than the bond tool insert. This is the reason why we need the wafer pieces.

b) Take the sliding caliper and measure the whole stack thickness.

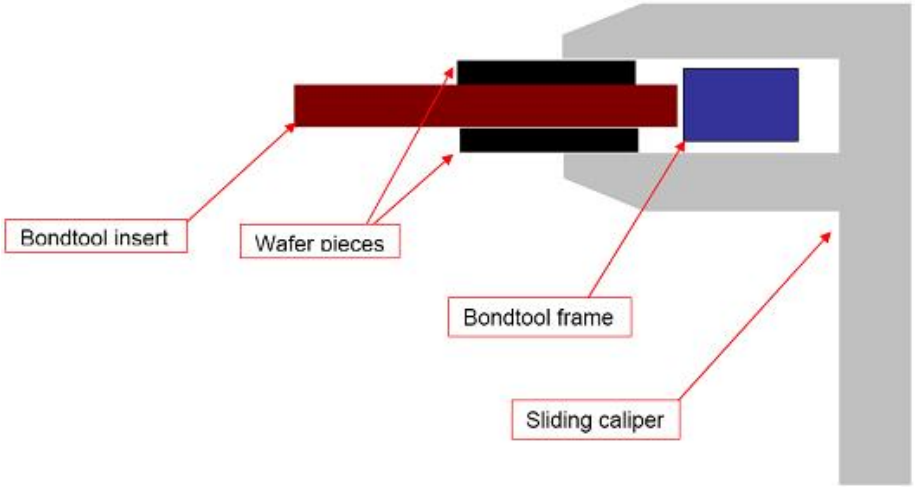

Figure 6 - Sliding Caliper

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c) Bond tool insert thickness = measured value – wafer thickness
   e.g. measured value 9,2mm; wafer thickness 500 µm
   9,2 mm – 2 x 500 µm = 8,2 mm bond tool insert thickness

d) Repeat the measurements on these points

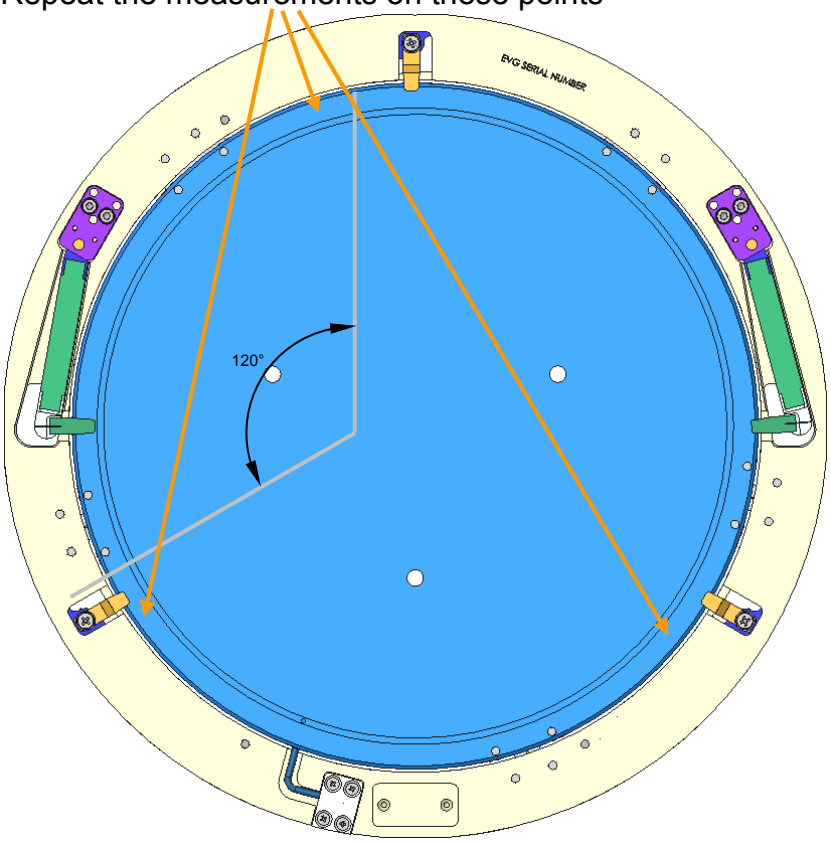

Figure 7

e) Repeat this measurement procedure on all bond tools

f) All measured points should have the same value

If there is one “bad” measurement point, we recommend sending back the bond tool for further analyses at EV Group.

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3.5 Flags

Make a visual inspection of the flags on the bond tools. Ensure that the flags are not bent, and that the screws which hold them in place are secure. The flag height must be higher than the bottom wafer.

Figure 8 - Flag on the Bond Tool

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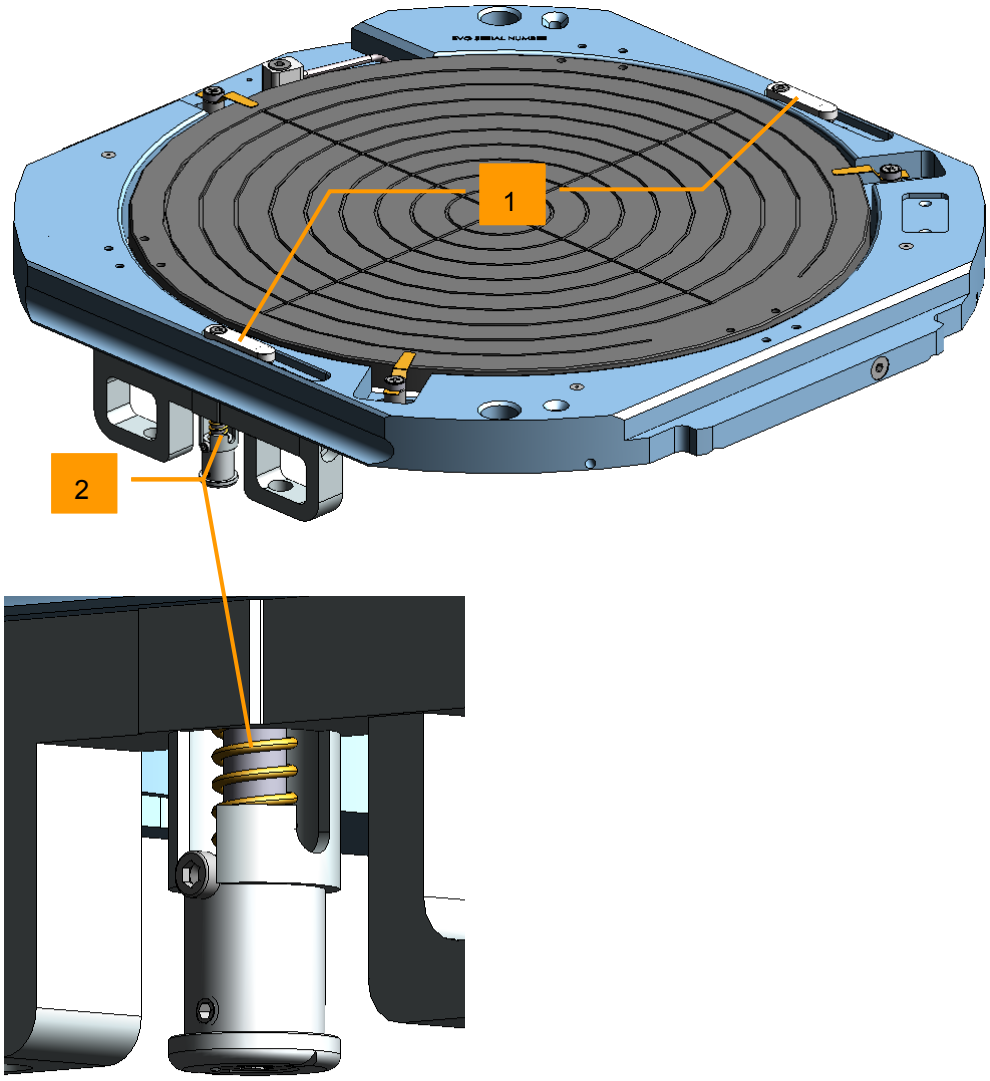
3.6 Clamping Feet

1) Ensure that the clamping feet mechanism is working smoothly and all screws are tightened.
2) Replace the springs of the clamping feet mechanism for preventive maintenance.



1	Clamping Feet
2	Spring

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3.7 Clamping Force

Note: Wrong adjusted clamp force can cause misalignment during the bonding sequence.

3.7.1 Required Tools

The following tools are required in order to measure the clamps:

3.7.1.1 Spring Balance

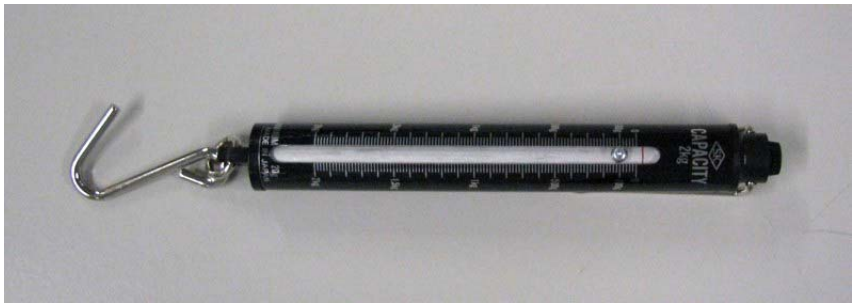

Figure 9 - Spring Balance

3.7.1.2 Measurement Fitting

Figure 10 - Measurement Fitting

3.7.1.3 Measurement Plate

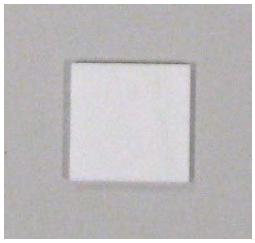

Figure 11 - Measurement Plate

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3.7.2 Prepare Bondchuck

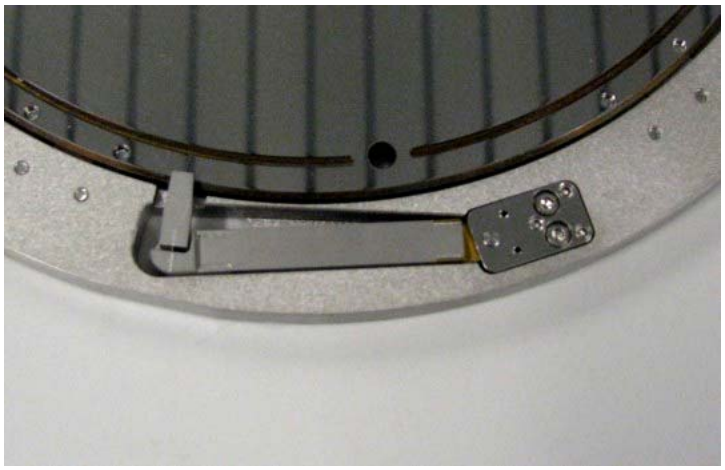
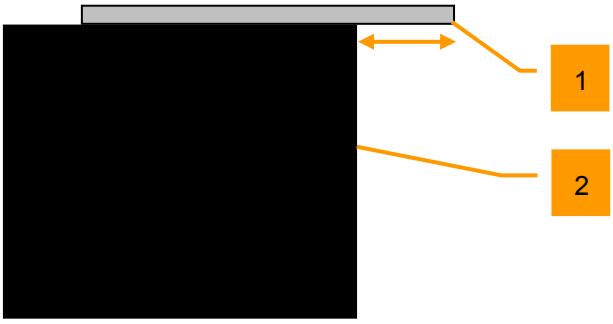


Figure 12 - Bondchuck



1	Bondchuck
2	Desk

The Bondchuck has to be positioned on the desk as shown in the picture above. It should be around 5 cm above the desk edge in order to perform the measurement with the Clamp Measurement Tool.

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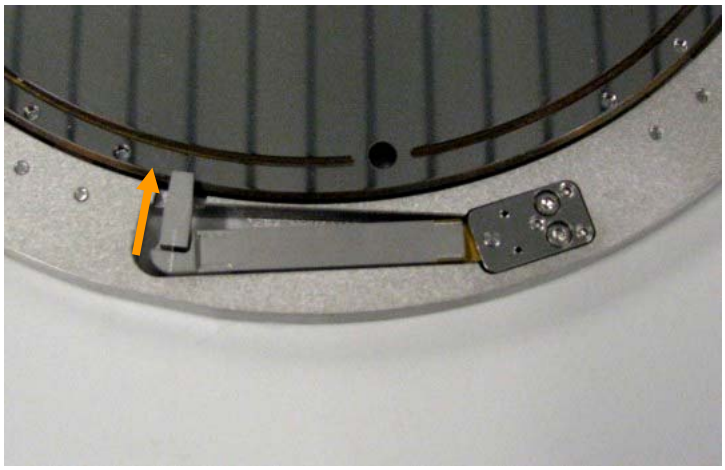
3.7.3 Prepare Clamp: Move Flag / Clamp Inside

Move the Clamp towards the center of the Bondchuck.



3.7.4 Mount the Measurement Fitting

Figure 13 - Measurement Fitting

Insert the measurement fitting and turn it clockwise:

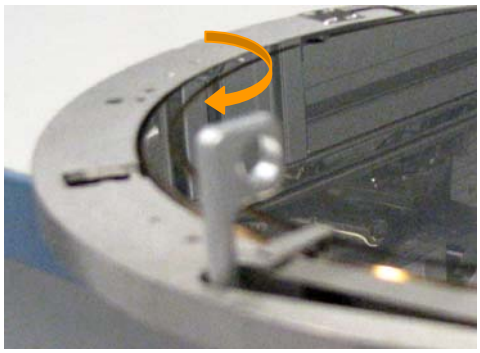


Figure 14 - Mounting the Measurement Fitting

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3.7.5 Install Spring Balance

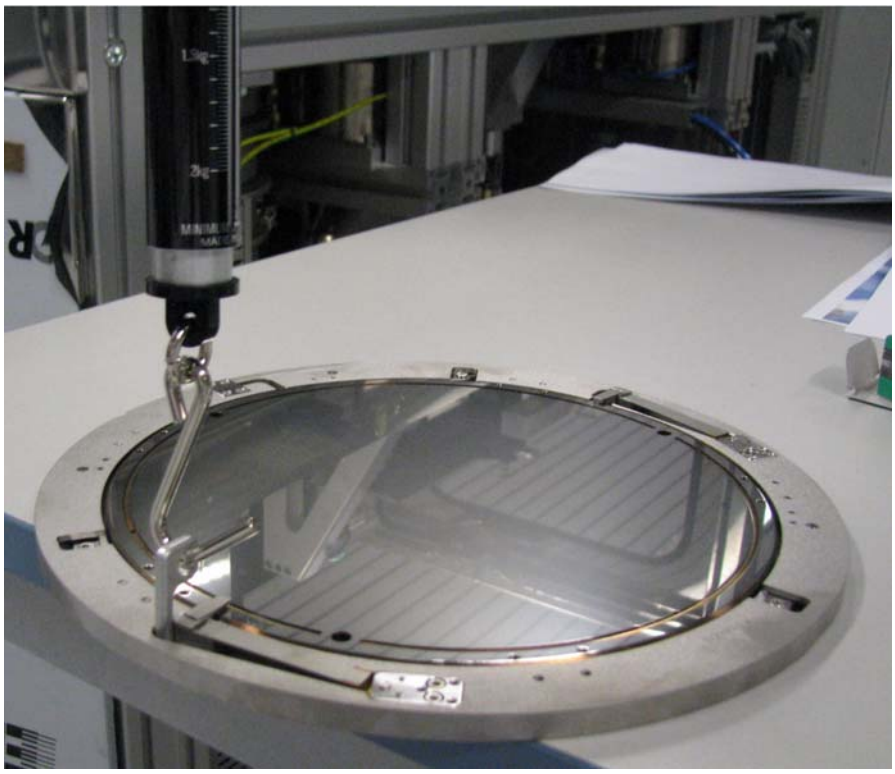

Figure 15 - Installing Spring Balance

3.7.6 Measurement

- Lift the Spring Balance:

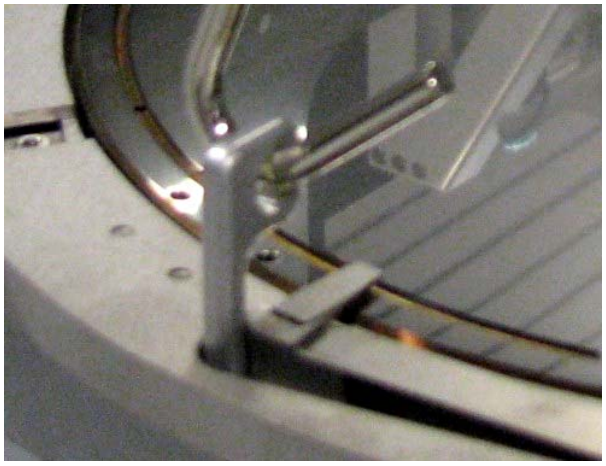

Figure 16 - Lift Spring Balance

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- Insert the Measurement plate between the Flag and the Bondchuck:

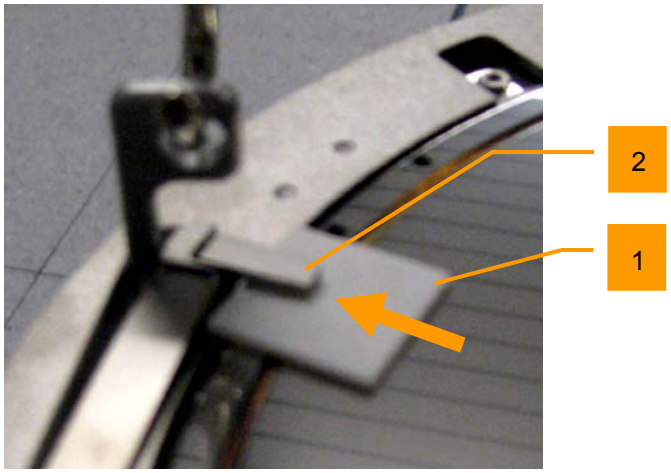

Figure 17 - Insert Measurement Plate

1	Measurement plate
2	Flag

Lift off between measurement plate and flag should be reached at a clamping force of: see next chapter

3.7.7 Clamping Force

The appropriate clamping force range depends on the wafers that are clamped. The following table gives a guideline. Any deviation from standard wafers (non-Si wafers, special shape of the wafer edge, thinner wafers, defective edge…) requires an investigation of the appropriate clamping force.

Bondchuck/Wafer inch	**Clamp force [N]**
6” Si wafer; standard thickness	8 - 12 N
8” Si wafer; standard thickness	8 - 12 N

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3.7.8 Adjustment of Clamping Force

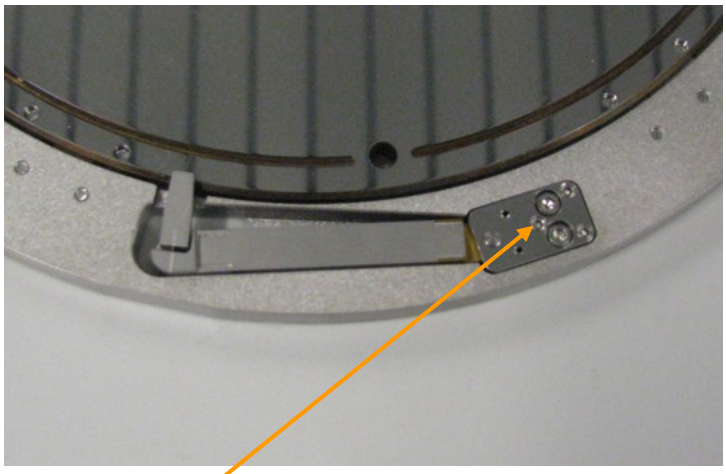

Figure 18 - Grub screw

The grub screw adjusts the height of the clamping arm and therefore also the pressure, which is applied to the wafer stack.

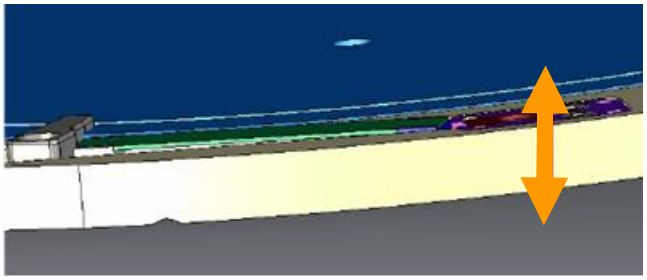

Figure 19

These screws are used for the “fine tuning” and for fixing the position of the clamping arm.

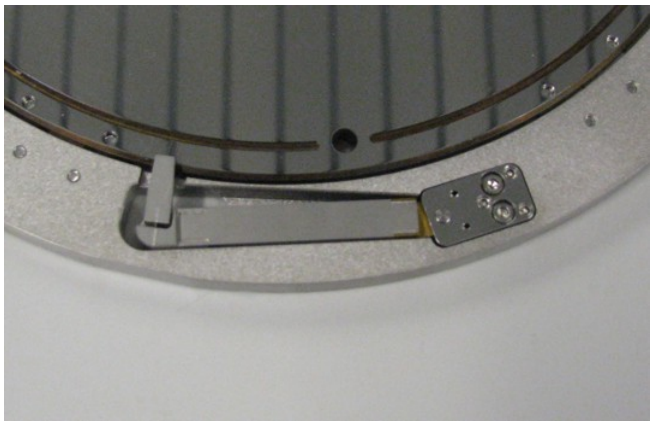

Figure 20 - Clamping arm

After this procedure check the clamping force again. Repeat these steps until you reach the desired result.

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3.7.9 Check the clamping force with a Force Gauge

The appropriate clamping force range depends on the wafers that are clamped. Any deviation from standard wafers (non-Si wafers, special shape of the wafer edge, thinner wafers, defective edge,..) requires an investigation of the appropriate clamping force.

Required tools: (shown in Figure19 and 20)

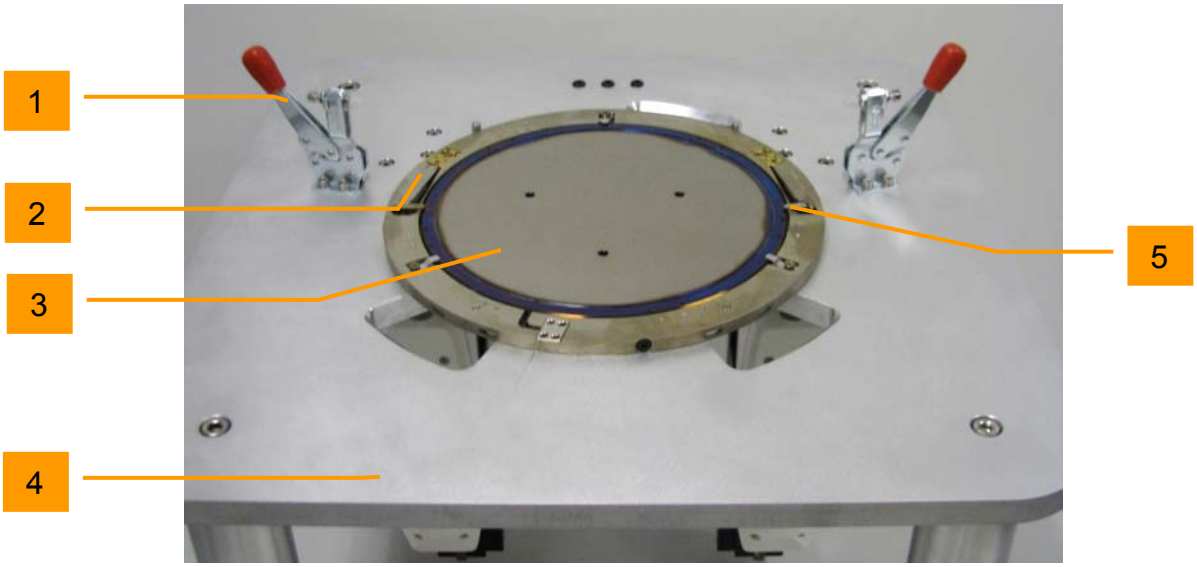

Figure 21 - Top view

1	Clamps
2	Clamp arm
3	Bond chuck
4	Table
5	Flag

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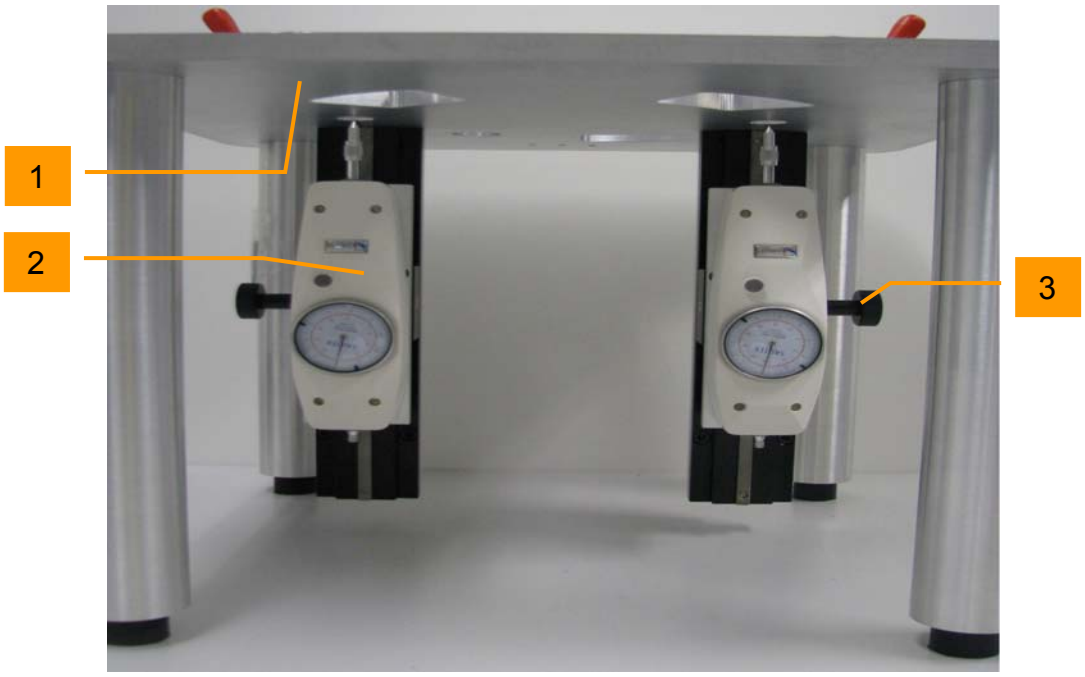

Figure 22 - Front view

1	Table
2	Force Gauge
3	Regulator

The appropriate clamping force is measured by using the Force Gauge, which is situated under the table.

Figure 18- Force Gauge

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Measurement:

Turn the regulator until the measurement plate fits under the flag.

The measurement plate should fit under the flag when a clamping force of about 10N is reached.

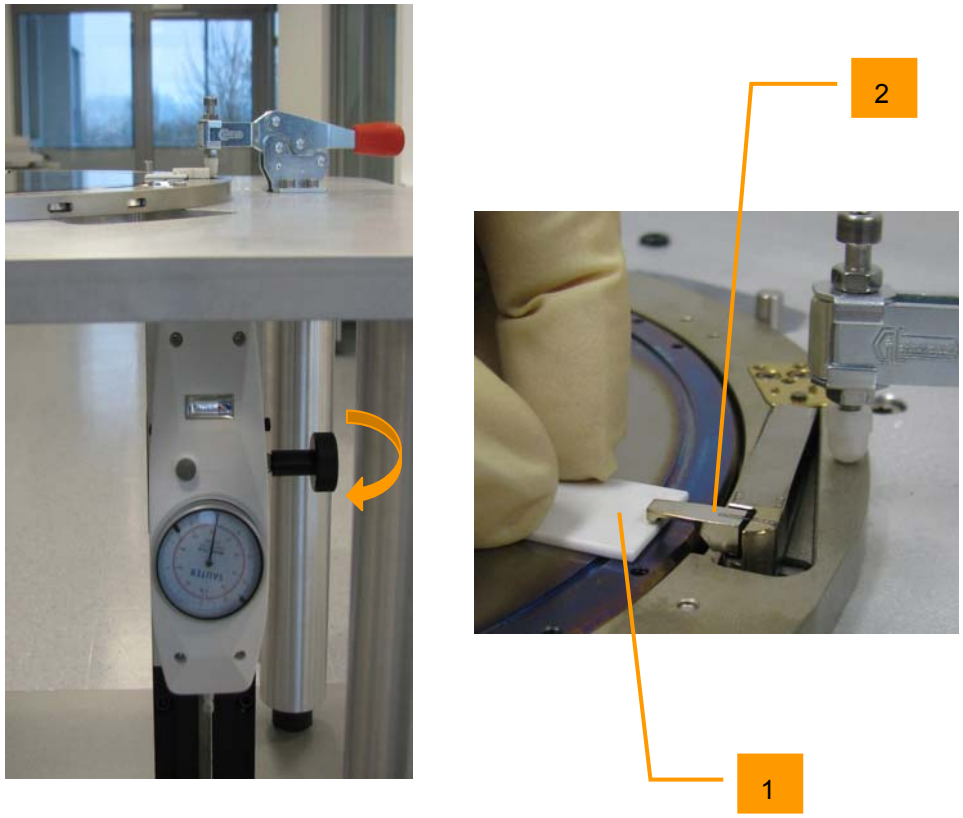

Figure 19 - Measurement

1	Measurement Plate
2	Flag

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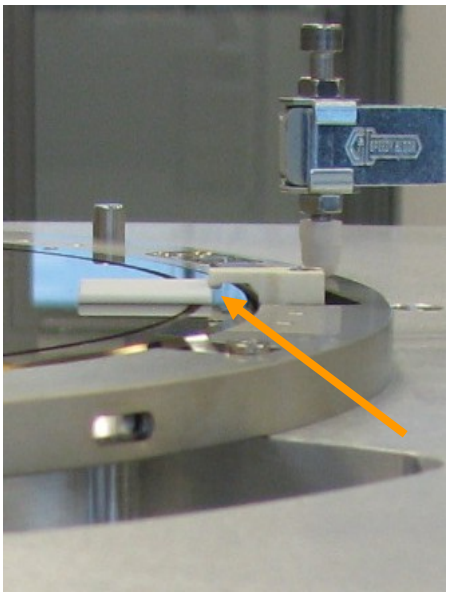
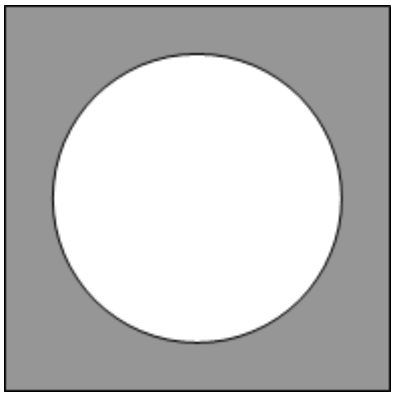


Figure 20 – Clamping force of 8 N

3.8 Clamping glasses

Make a visual inspection of the clamping glasses. Insure that there are no scratches or cracks.



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4 Weekly Maintenance

4.1 Before starting Weekly Maintenance

Perform daily maintenance as described in the previous chapter.

4.2 Error Tracking: Memory Leak

We recommend restarting the system computer and the Microsoft Windows operating system in a regular interval, like during the weekly pre-maintenance, to avoid problems and to ensure a stable production environment.

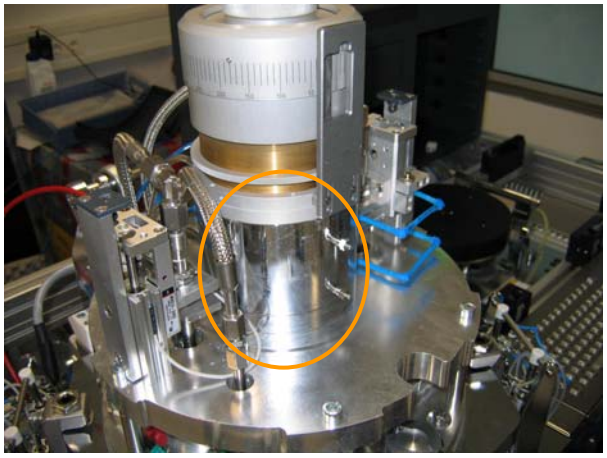
4.3 Hydraulic Systems

4.3.1 Hydraulic System

4.3.1.1 Working Principle

The hydraulic equipment consists of these major parts:

- Hydraulic cylinder (mounted on pressure head)



- Pressure converter (converts pneumatic into hydraulic pressure and increases it by factor 10 or 16 – find more information in following “Note”). 5bar (500kPa) pneumatic pressure equals 50bar (5MPa) hydraulic pressure.

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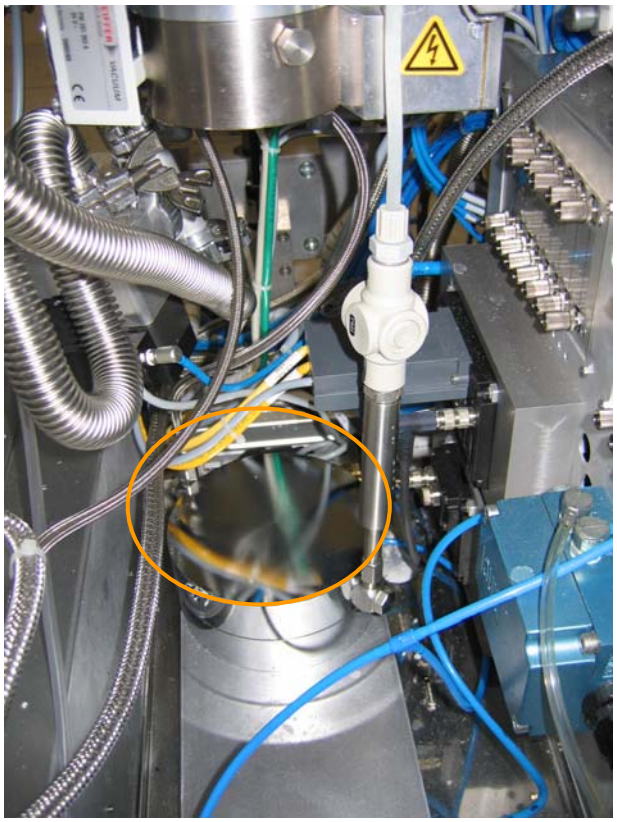
Note: The increase factor depends on the system. Use factor 10 for 40kN and factor 16 for 60kN!

- Medium separator (used to accomplish hydraulic piston up function)



- V/P (voltage/pressure) converter; software-controlled prop. Valve, which generates control pressure (0 – 5500mbar, 0 – 550kPa) for the pressure-converter.

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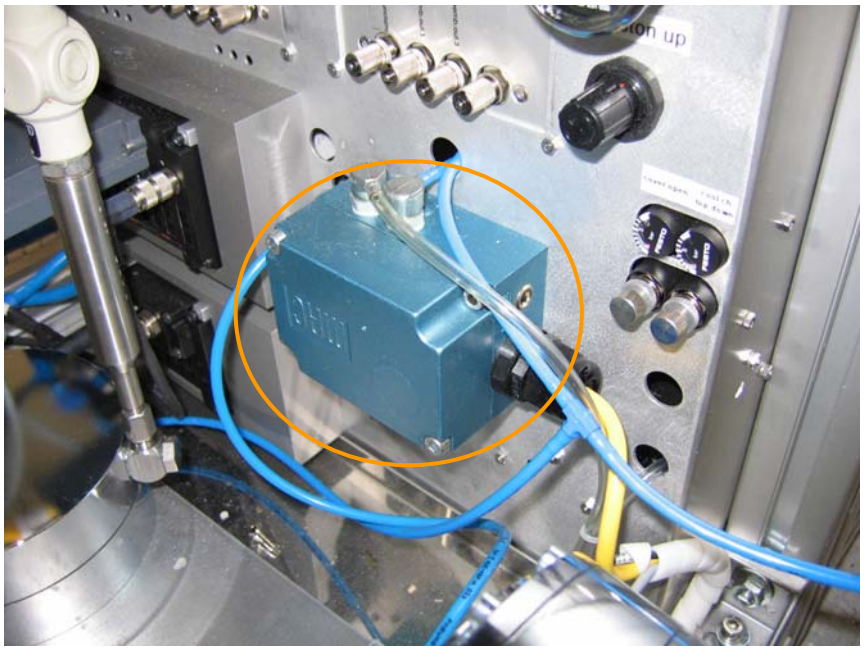
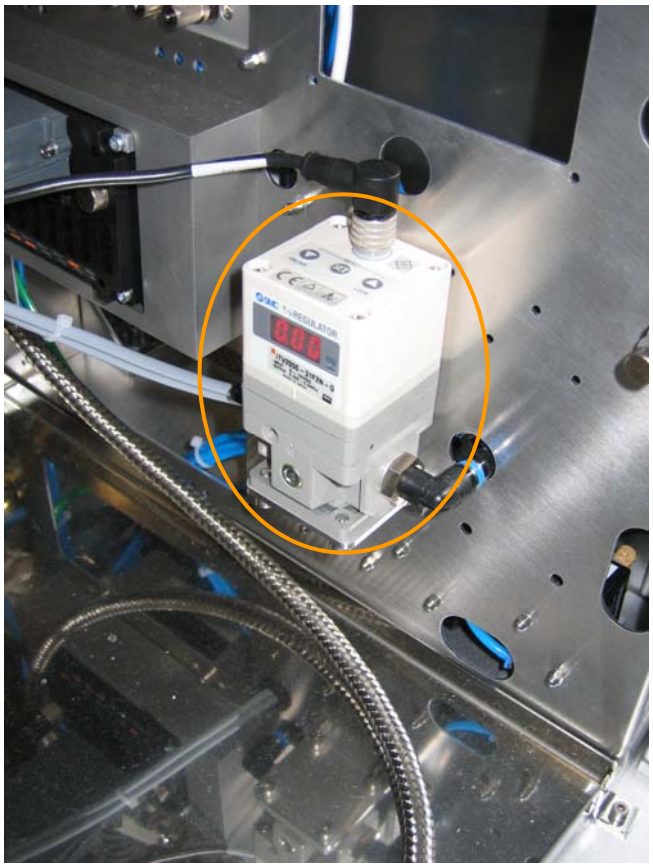
MAC valve (old systems)



SMC valve (new systems)



In order to apply piston pressure (=apply force onto the wafer stack), please see following section. For better understanding, please see schematic drawing on next page.

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4.3.1.2 Applying Piston Pressure in Manual Mode

- The pressure cover has to be closed and locked.

Software interlock will prevent the system from applying piston-pressure with pressure-head open.

- A bond tool has to be in the chamber in order to avoid destruction of the pressure-disc caused by the bottom-heater chuck-centering pin.

After starting up the EVG Bonder software, please open up the “Manual Setup” (6” systems) or the “Bonder diagnostic” (8” systems & EVG560).

(Move with cursor over bond module icon and press right trackball button)

Choose Piston → Set Piston Force

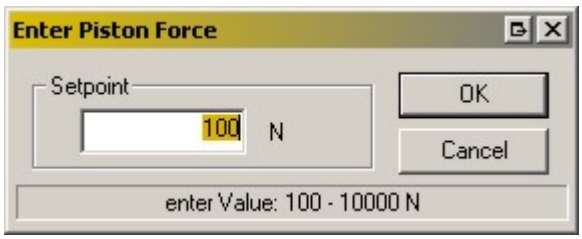

Figure 23 - Enter Piston Force

Parameters

A properly working hydraulic system should achieve following parameters:

Set force [N]	Pneum. Press [mbar]	Pneum. Press [kPa]	Hydr. Press [bar]	Hydr. Press [kPa]
10870	1500	150	15.5	1550
26980	3500	350	37.8	3780
39100	5000	500	54.4	5440

Due to machining tolerances, there can be a slight difference between identical systems (multiple chamber systems). This can be compensated with offset values; therefore table above may slightly vary from system to system.

For testing purposes, we recommend to use a metal-disc (wafer size, Al) instead of a wafer in order to avoid destruction of wafer, bond tool or pressure-disc.

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4.3.1.3 Troubleshooting

Max. Pressure cannot be achieved or hydraulic pressure is OFF

- Inlet air-pressure too low: Check inlet pressure to be at 6bar (600kPa) /87psi
- Adjustment of V/P converter is off or the V/P-converter is bad: Check pneumatic pressure with a gauge (see values in above table) and call EVG Service
- Stack height too low: Increase stack height and try again
- Hydraulic system contains air: Fill/bleed the system (Filing / Bleeding the hydraulic system)

Max. Pressure cannot be kept

- When the hydraulic pressure get lost after ~8min: increase stack height and try again
- The maximal hydraulic pressure can be achieved but not kept: increase stack height and try again.
- Bleed the hydraulic system and try again.
- If this does not solve the problem call EVG-service.

“Hydraulic Fail” Error message in the software

- Check filling-level in the hydraulic-fluid reservoir.
- Check “sensitivity” pot on the filling level sensor amplifier (call EVG service)

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4.3.1.4 Hydraulic System Maintenance

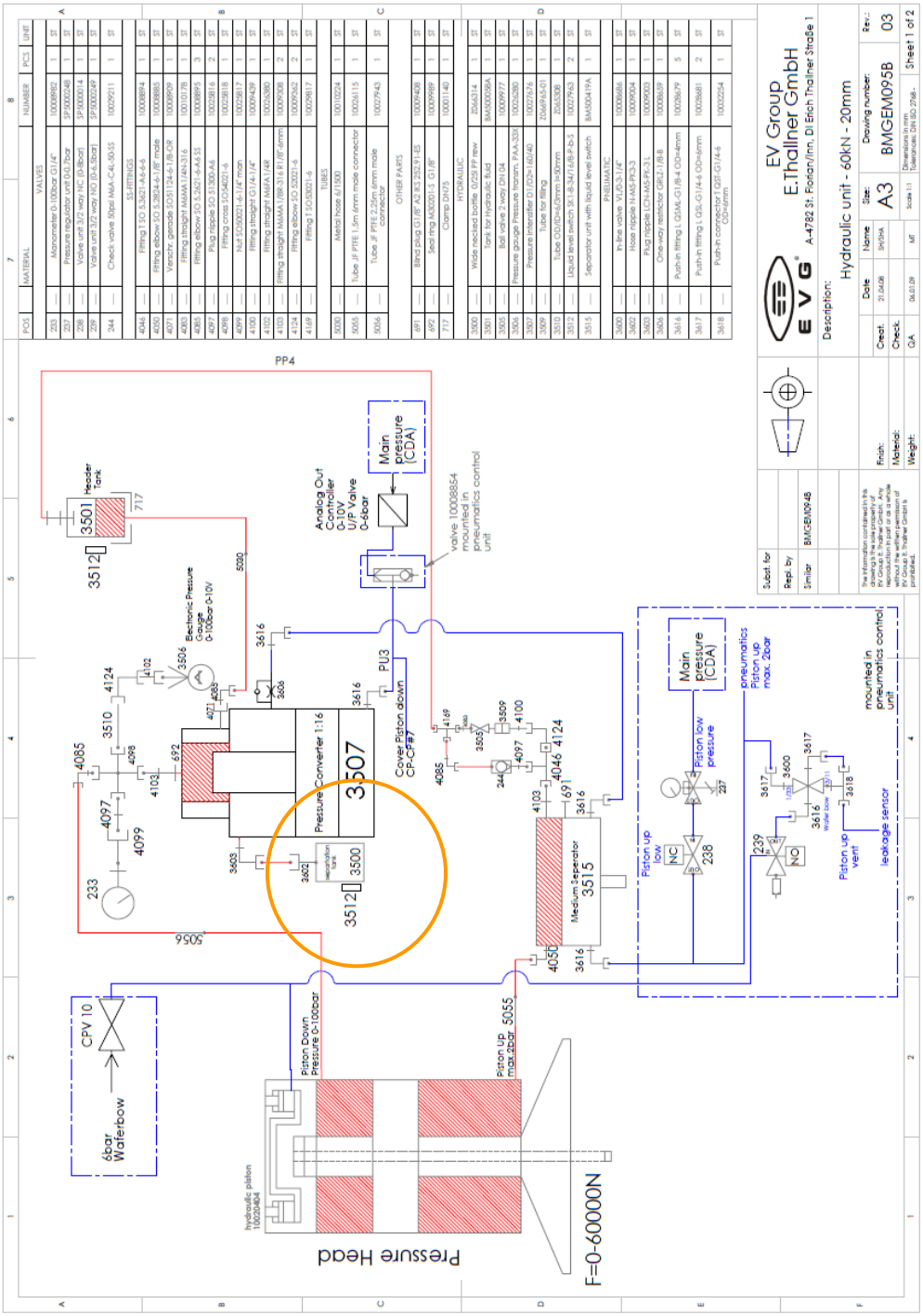

Figure 24 - Hydraulic System

Note: Red circle: Pressure converter 1:10 or 1:16 (depends on system!)

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4.3.1.5 Filling / Bleeding the hydraulic system

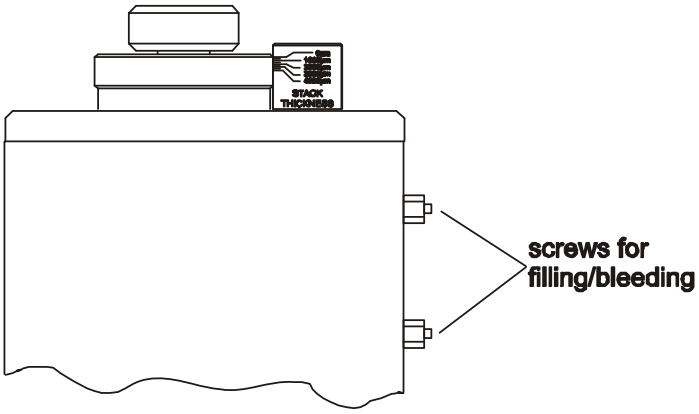

Figure 25

Filling bleeding of the upper hydraulic circuit

1) Press Piston up button
2) Open the pressure cover. Again make sure the piston is in its upper position and the piston up pressure-regulator is set to 2 bar (200kPa).
3) Close cover.
4) Make sure, enough hydraulic fluid is in the header-tank. (Filling level should be above the filling-level sensor)
5) Connect short hose to the upper screw on the pressure-head (see drawing above or picture below) and open the screw 1 rotation counterclockwise. Wait till the hydraulic fluid comes out without any air-bubbles.

Figure 26

6) Tighten the screw again and remove the hose.
7) Refill hydraulic fluid in the header-tank if necessary.

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Filling / bleeding the 2nd hydraulic circuit

1) In order to fill the lower hydraulic circuit, the piston must be in its lowest position.
2) Make sure that there is no bond chuck loaded.
3) Remove the center pin on the bond chuck.

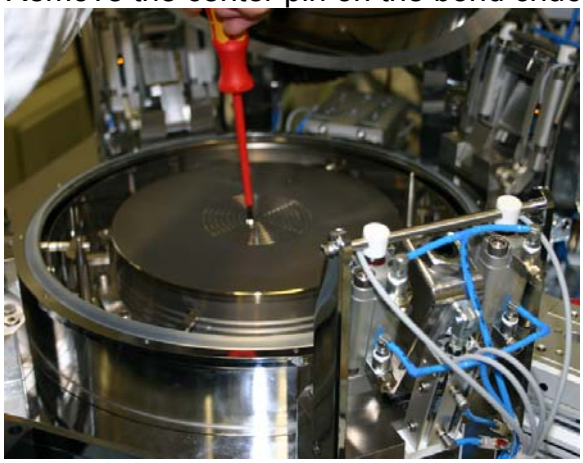

Figure 27

4) Screw the wafer bow scale complete down and turn it up again 1mm.
5) Activate the wafer bow (software) to move the piston down in its lower position. Make sure the Piston is moving down to its lower position.

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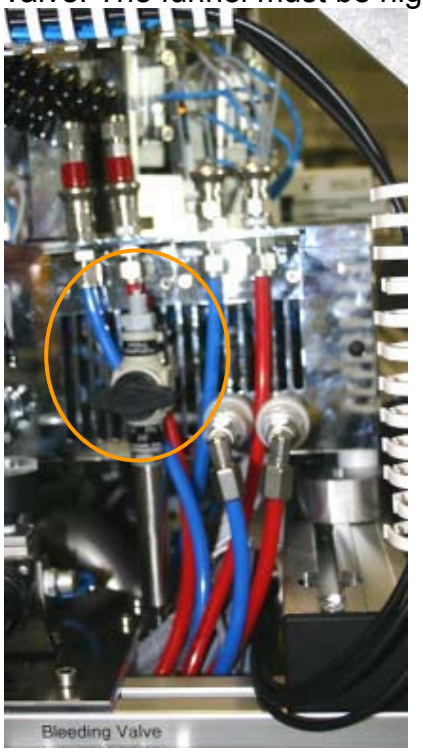
6) Disconnect the transparent hose leading to the manual shutoff-valve and connect a funnel mounted on a hose on the shutoff valve. The funnel must be higher than the cover.



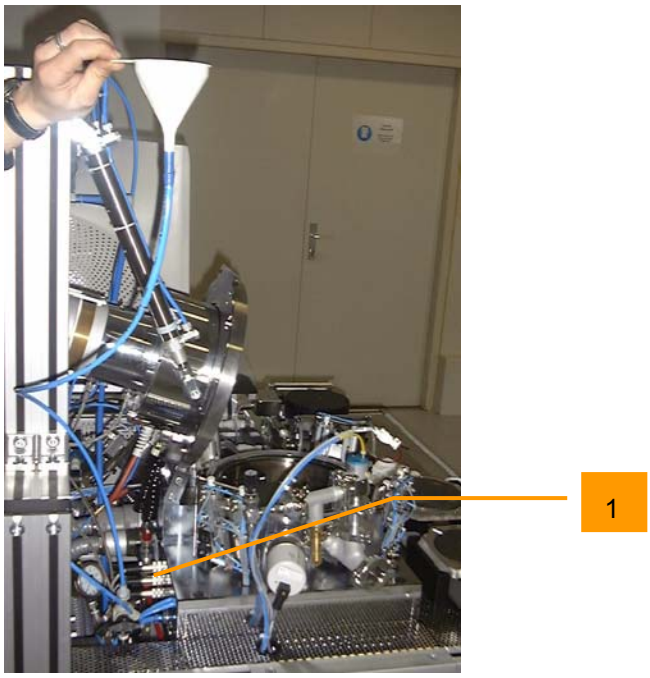


Figure 28

1	Connect here!

Attention: Make sure the hose is long enough (funnel must be higher than the pressure - head)

7) Fill the funnel with hydraulic fluid and open the shutoff-valve.

8) Now connect a short hose on the lower screw of the pressure head (picture below), open it one rotation and wait again until the fluid comes out without any bubbles. Then tighten the screw and close the shutoff valve.

Figure 29

9) Remove hose and funnel and reconnect the blue hose to the shutoff valve.

10) Move the Piston UP.

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4.3.2 Hydraulic System Upgrade (currently used)

4.3.2.1 Schematics

Without back pressure control

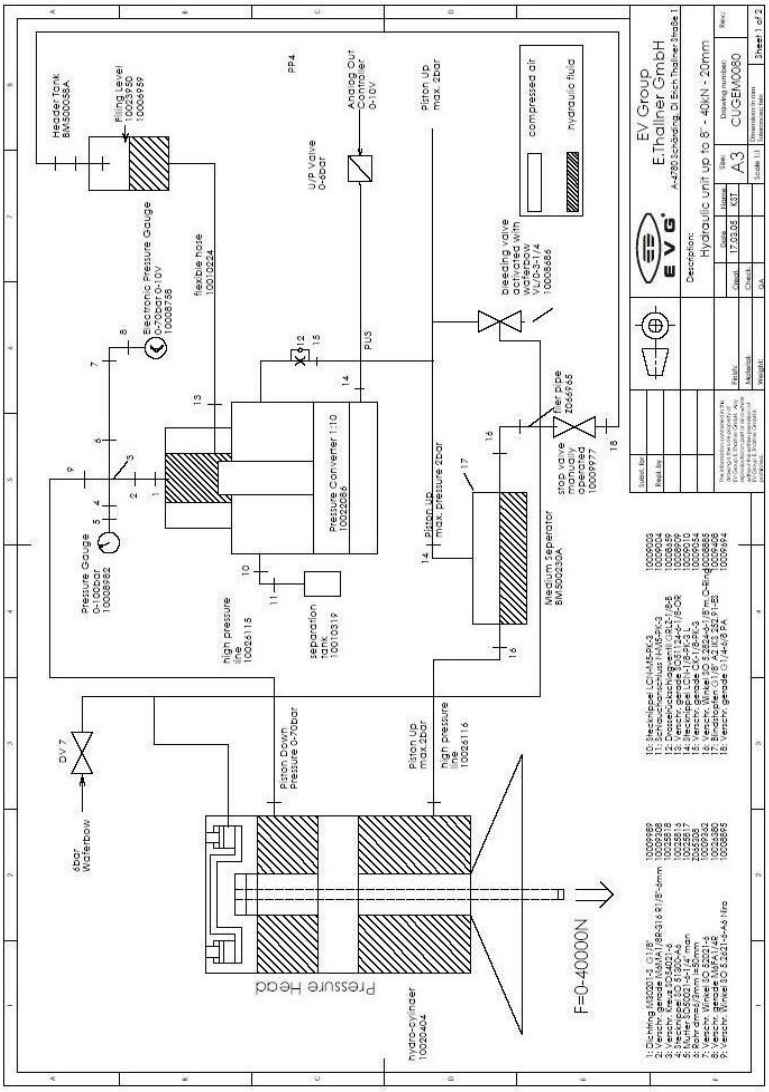

Figure 30 - Hydraulic System without backpressure control

Note:

“Piston up” and “pressure-converter up” are connected and use a pneumatic pressure of 2bar. A medium separator is used to build up a hydraulic pressure of 2bar to drive the hydraulic piston up.

The hydraulic-cylinder is a “double-acting” cylinder with hydraulic-function for up and down motion.

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With backpressure control

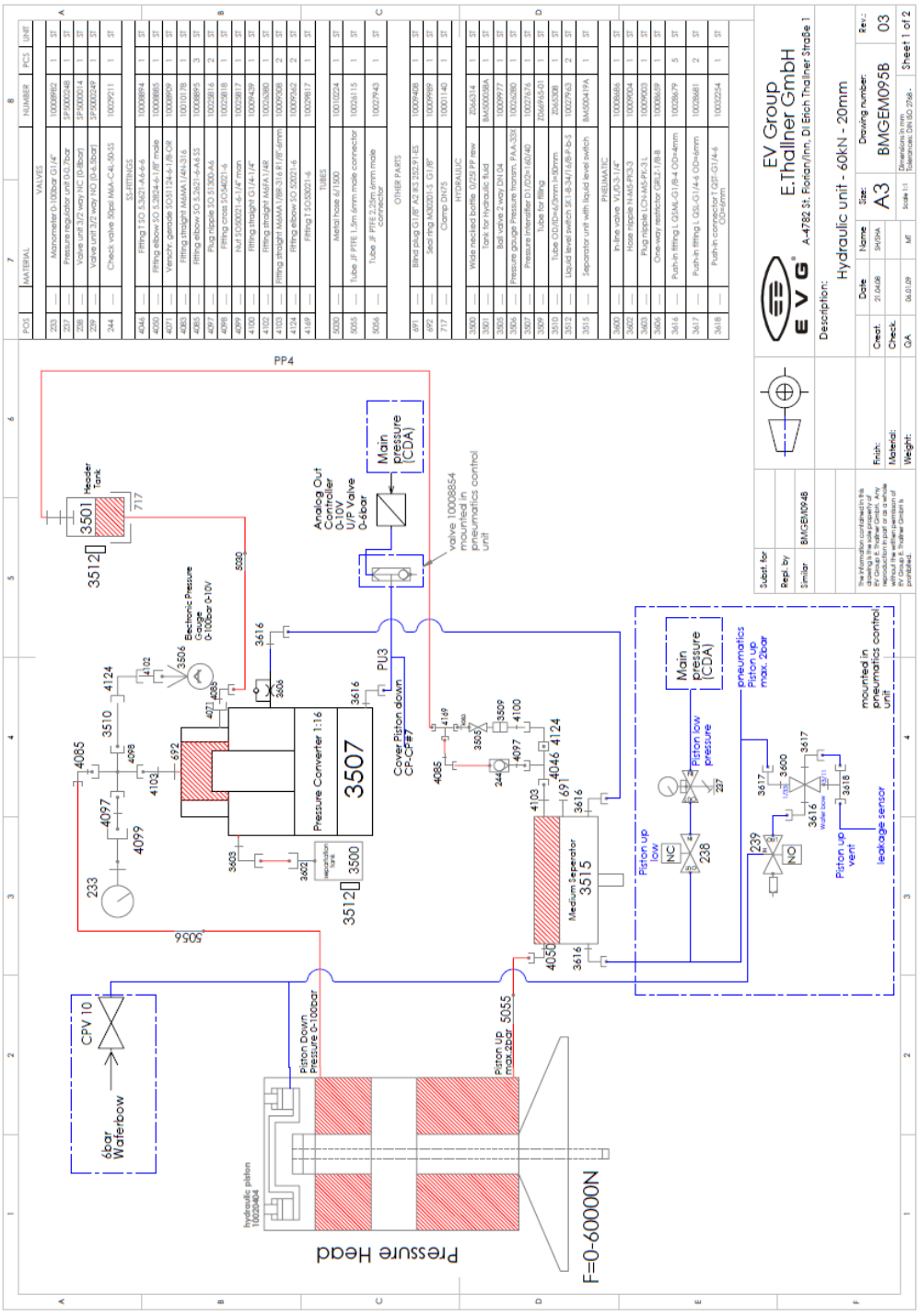

Figure 31 - Hydraulic System with backpressure control

Note:

An additional output (pneumatic valve) is equipped for better force accuracy control. After piston down the “piston up low/vent” valve gets activated and pressurizes the piston up at 0,2bar. This pressure compensates the friction of the hydraulic gaskets and allows better force-control in the low range.

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4.3.2.2 New Hydraulic System

Function description

Other than on the old hydraulic system, the new hydraulic-cylinder is only a single-acting cylinder anymore. This means, only the “piston down” function is a hydraulic; the “piston up” function is now executed by a pneumatic-cylinder on top of the Hydraulic-cylinder.

This makes the medium-separator and other components in the hydraulic-system obsolete, they can be removed.

Mounting threads and other dimensions are the same on old and new system so the new-cylinder can be installed without adapters or any major changes to any EVG equipments.

Further modifications:

- Permanent magnet in the upper piston-rod to avoid any movement (caused by the chamber-vacuum) while the top-heater is in wafer bow-position.
- possibility to install a loadcell
- no more retract-spring, the contact-force is not stroke-depending anymore
- ”leak line” equipped. In case of a leak, hydraulic fluid is led through this line into the separation bottle located next to the pressure-converter.

Note:

The sliding gasket cannot provide 100% tightness, a leak rate of up to 15ml per 500 strokes is considered acceptable.

In 24/7 operation, the separation tank should not have to be emptied more than once in 6months.

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Schematics without backpressure control

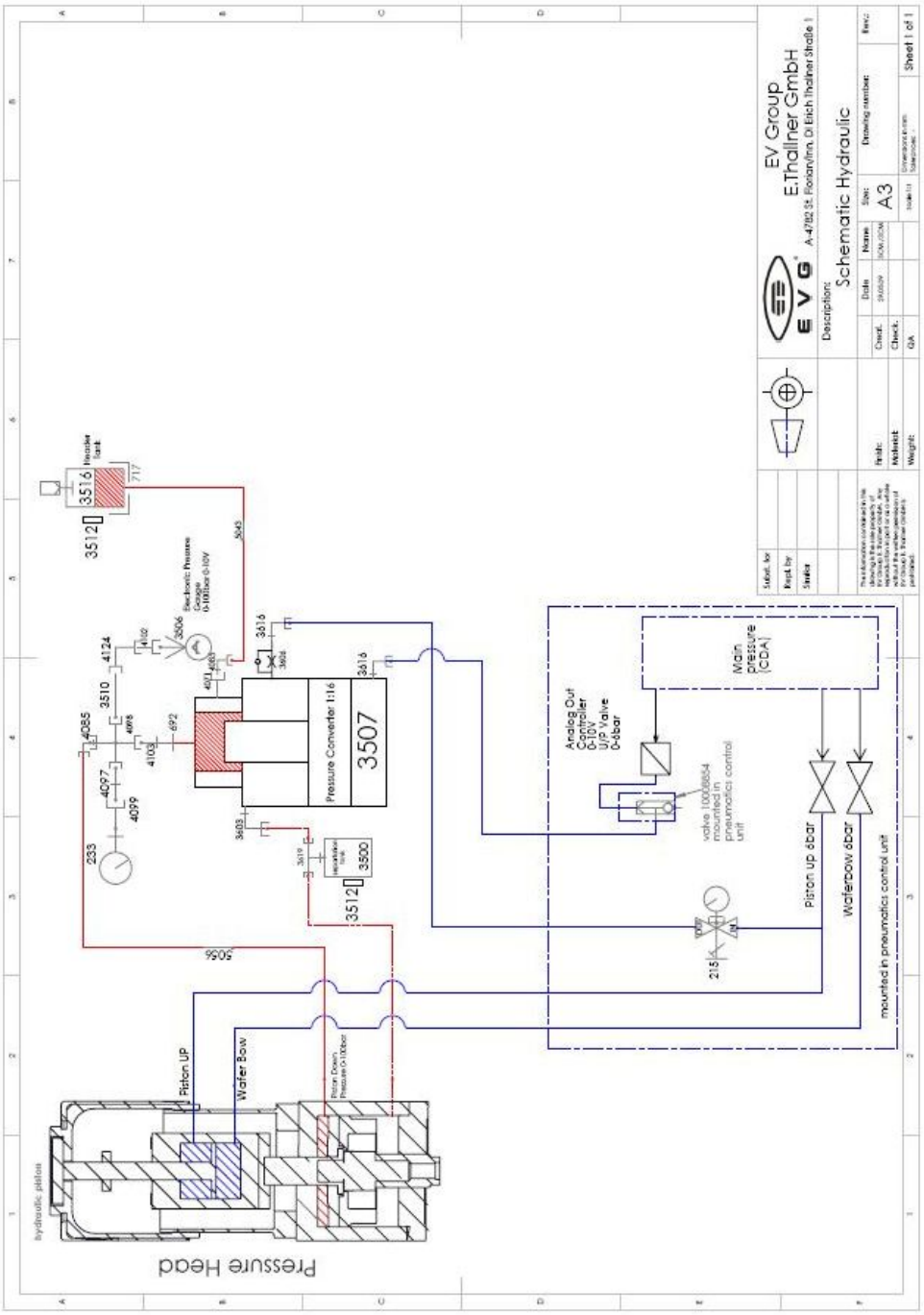

Figure 32 - Hydraulic System without backpressure control

Note:

Pneumatic cylinder inside the hydraulic cylinder assembly uses a “piston up” pressure of 6bar. The pressure-converter uses a pressure of 2bar only.

The separation-tank is connected to the hydraulic-cylinder and the pressure converter through 2 independent leak lines.

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Schematics with backpressure control

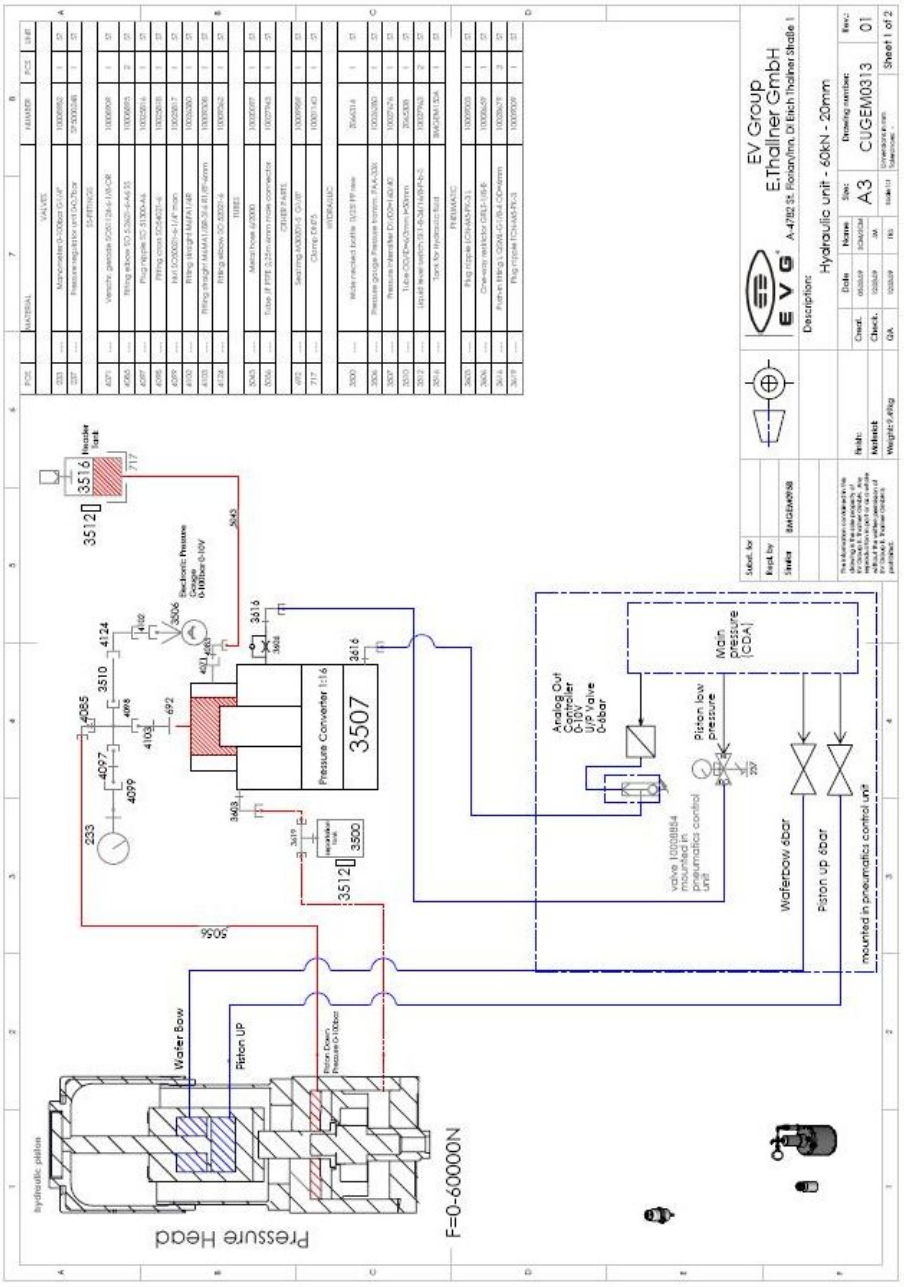

Figure 33 - Hydraulic System with backpressure control

Note:

The pressure-converter is driven back by the “piston low” pressure (0,2bar) only. This pressure is attached permanently.

4.3.2.3 Installation of the Upgrade

Components

Following part numbers (bill of materials) contain the necessary parts for the upgrade:

SP5000495	Hydraulic unit single acting w/o bow
SP5000496	hydraulic unit single acting w. bow

Both BOM's contain the same fittings and tubes, only difference is the setup of the cylinder with or without wafer bow adjustment.

Installation of the new hydraulic cylinder

The change of the cylinder has to be done same way as before. No adapters or different bolts are required to install the new unit.

In order to align the threads in the pressure cover to the holes in the flange of the bellows (see figure 5), it may be necessary to rotate the piston rod a few degrees. Before doing so, pls. follow enclosed routine:

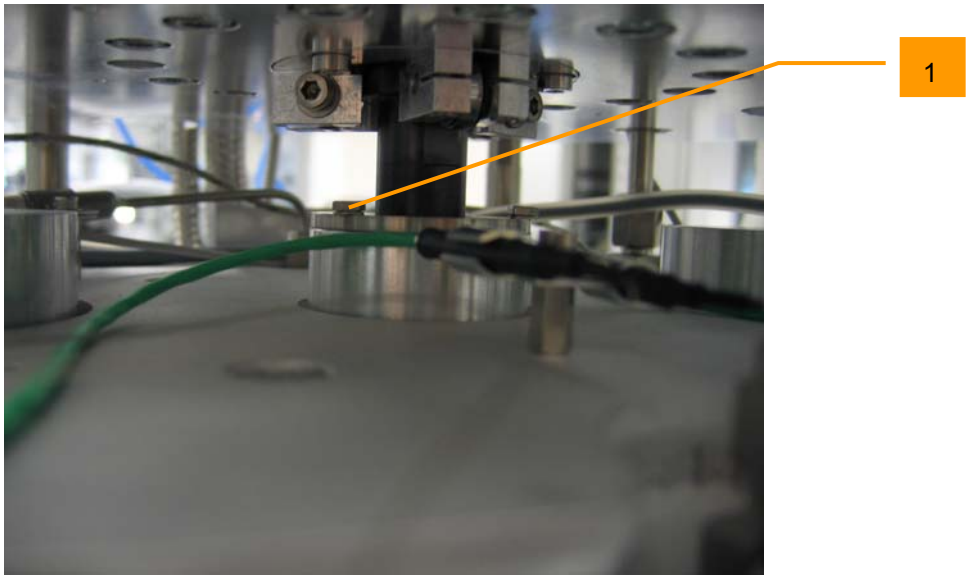

Figure 34 - Holes in the Flanges

1	Holes in the flanges have to be aligned

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Remove Top Cap

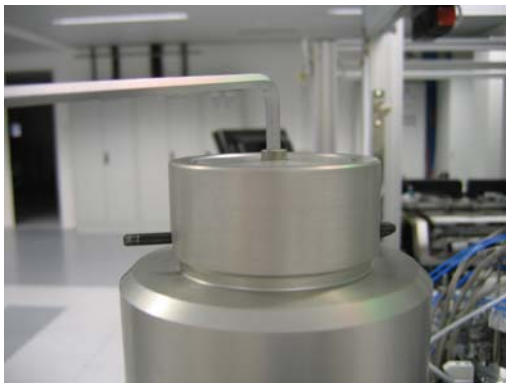

Figure 35 - Top Cap

Align hole in the piston rod to the hole in the cap and lock them by sticking an allen key through.

Then loosen screw on top.

After that remove screws on the side (for units with wafer bow: twist ring up and take it off)

Note: You'll have to overcome the force of the integrated magnet)

Remove pneumatic cylinder

Figure 36 - Pneumatic Cylinder

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Loosen center bolt and take square plate off

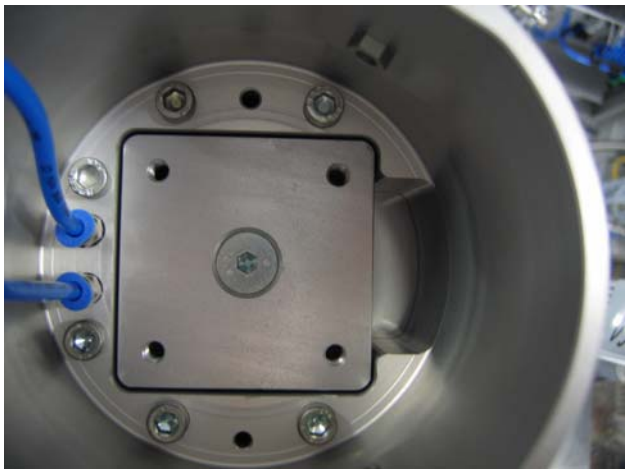

Figure 37 - Square Plate

Install piston rod

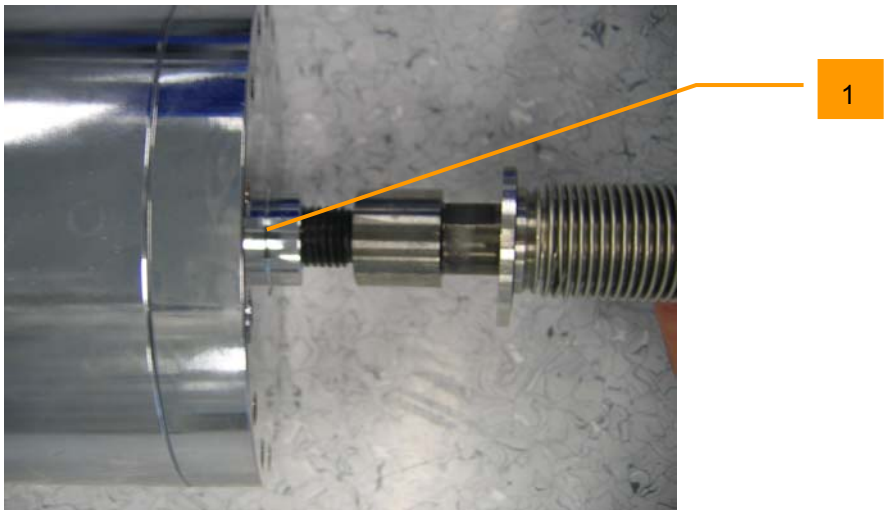

Figure 38 - Piston Rod

Install cylinder on pressure head

1	Use spanner 16mm to hold the piston rod.

Note:

If necessary to rotate the whole piston-rod assembly, always rotate clockwise to not loosen any bolted connections inside the cylinder.

After assembling install square cylinder base-plate again and tighten center bolt (use Loctite).

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Note:

Make sure to hold the piston rod in position to not tear the vacuum bellows). Then align the square base-plate inside the square cutout again.

Assemble pressure-head in reverse order.

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Removing of obsolete parts

Some components are not necessary with the new hydraulic-system anymore and can be removed

Medium separator unit

Figure 39 - Medium separator unit

Valves for piston up low/vent and medium separator venting valve

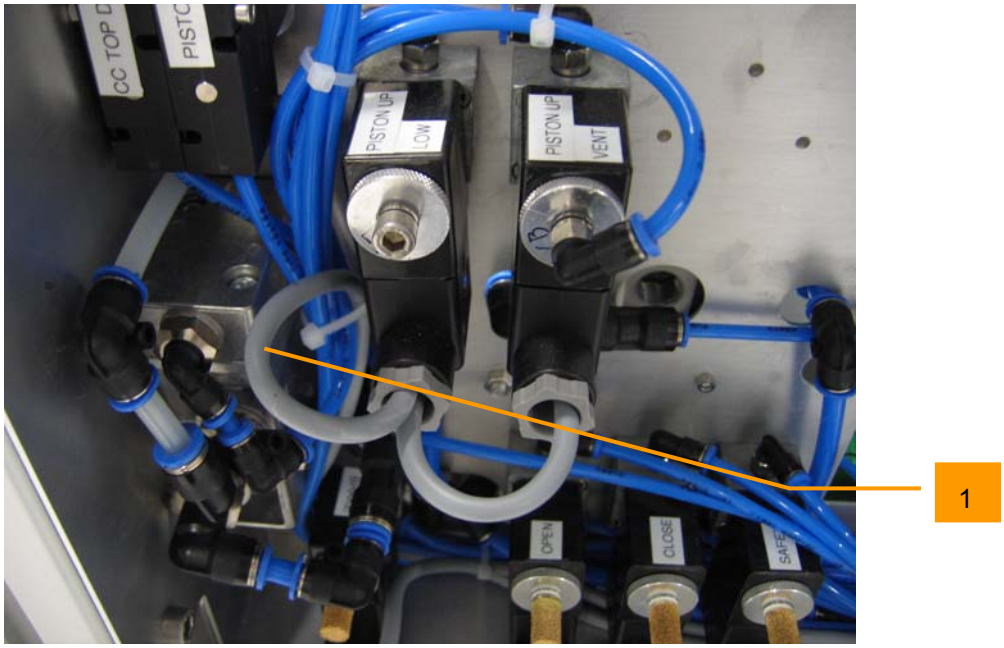

Figure 40 - Valves

1	Disconnect connection cable on the XCO board in the electronics section

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Changes on the pneumatic system

Please refer to schematics section 2.1.1 and 2.1.2 and this page for details.

Leak-line

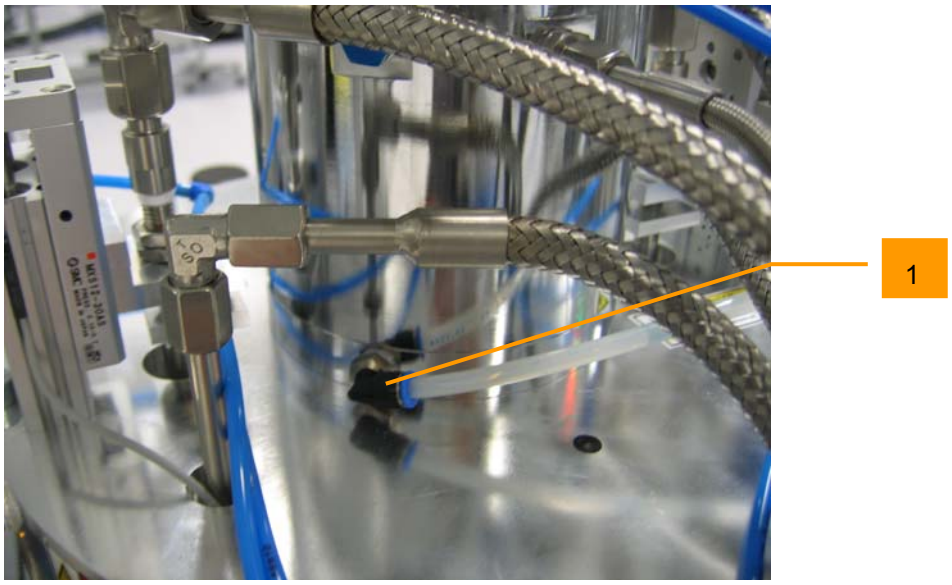

Figure 41 - Leak Line

1	Leak-line

Separation tank

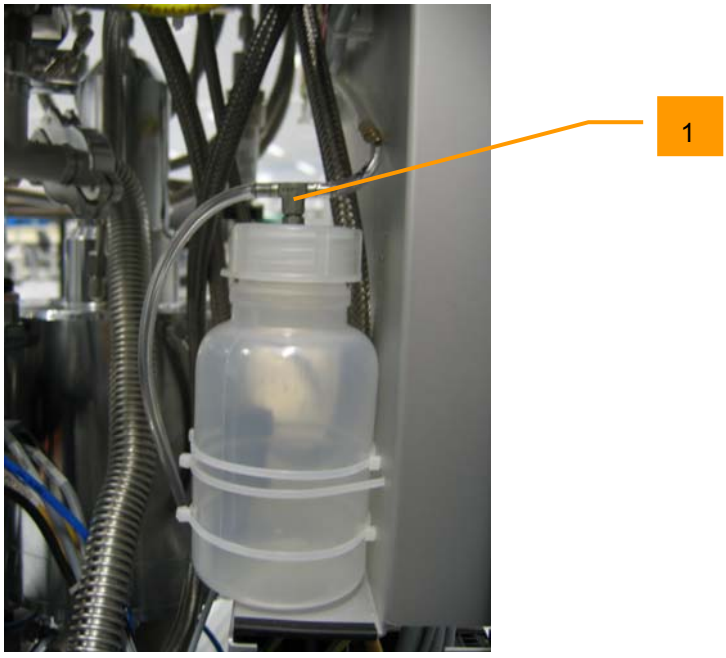

Figure 42 - Separation Tank

1	Separate leak-line for cylinder an pressure converter

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Pneumatic connections on the cylinder

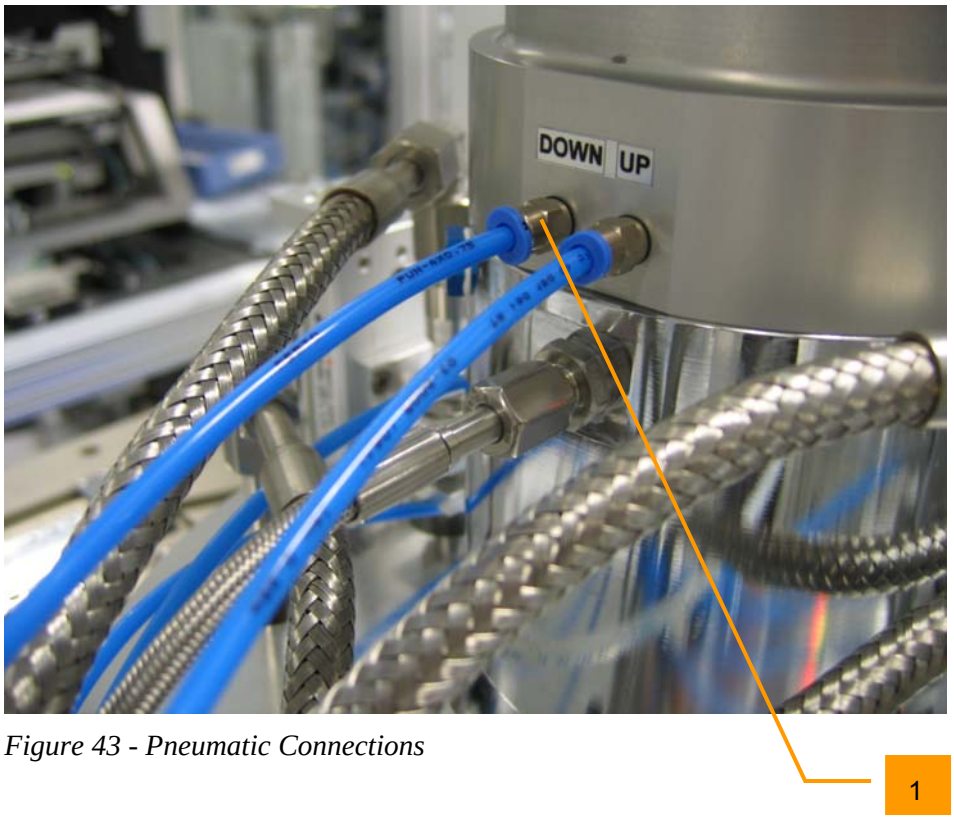

Figure 43 - Pneumatic Connections

1	Connect the “down” line at the wafer bow quick connector.

Bleeding the system

Follow existing routine to bleed the hydraulics.

Note: The “piston up” circuit does not exist anymore.

For easier bleeding disconnect the pneumatic “up” and “down” line while the piston is in upper position.

Loadcell test and adjustment

A loadcell-test including piston-force calibration is strongly recommended after the installation of the new hydraulic-cylinder unit.

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4.3.2.4 Using the hydrauling unit

Settings

Piston up pressure (1):

- 6bar
- to be adjusted at the pressure regulator inside the bonding module

Figure 44 - Piston up pressure

Piston low pressure (2):

- with 1/10 pressure-converter (SAP#10022086): ➔ 0,2bar
- with 1/16 pressure-converter (SAP#10027676): ➔ 0,3bar
- used for backpressure control
- located inside the bonding-module

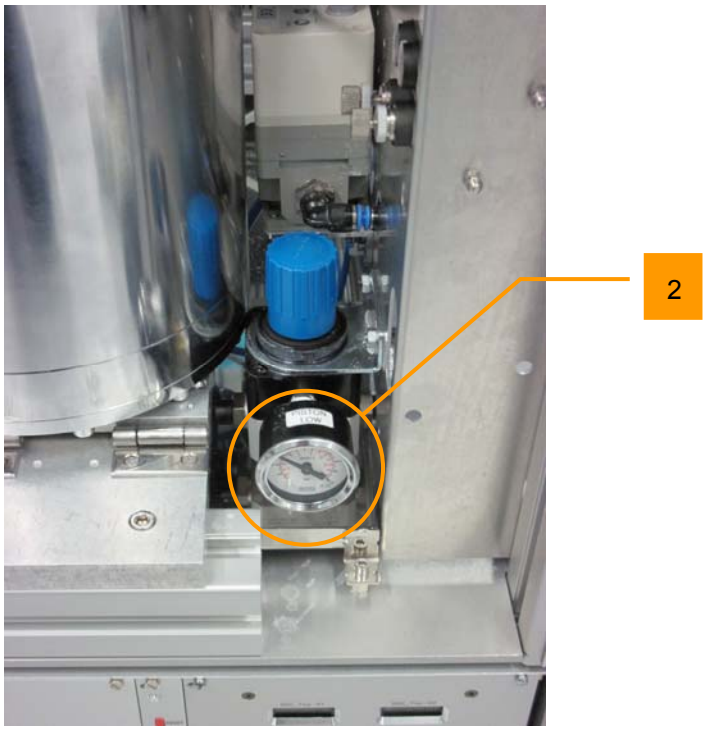

Figure 45 - Piston low pressure

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Maximum stack height measurement:

1) 20/40kN systems (cylinder diam. 100mm)

- SAP# 10032562 (with wafer bow unit)
- SAP# 10032368 (without wafer bow unit)

With wafer bow unit:

Set stack thickness to 20mm and apply “wafer bow” using the Low Level functions (clear “piston up” before).

Then apply caliper as shown in the figure below, set to “0” and execute “piston down” (empty bondchuck loaded in the chamber) and check stroke. Typically, the stroke will be in the 18 +/- 1mm range.

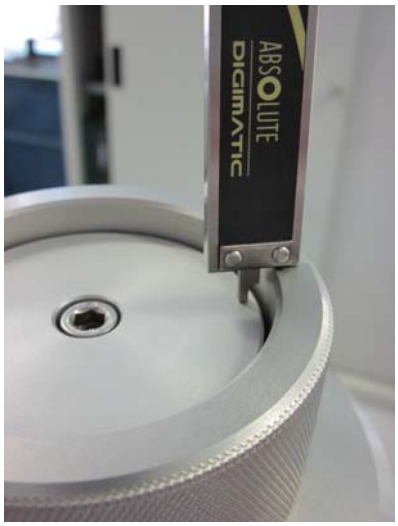

Figure 46 - Apply Caliper

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Without wafer bow unit:

Set the ring to its very high position and proceed like listed above.

Figure 47 - Setting the ring

2) 60/100kN systems (cylinder diam. 140mm)

- SAP#10032856 (with wafer bow unit)
- SAP#10033010 (without wafer bow unit)

With wafer bow unit equipped:

Set stack height to 0 and proceed with measurement.

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Without wafer bow equipped:

Set ring to its very lower position and proceed with measurement.

With piston in upper position, remove center aluminum plate (see this manual page 9) and apply caliper as shown in the figure below. Set caliper to 0 before measurement.

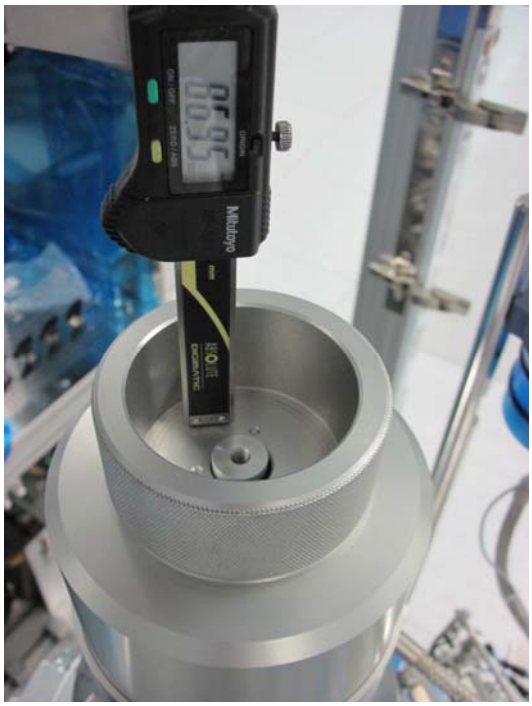

Figure 48 - Apply Caliper

Execute piston down (empty bond tool loaded) and check stroke.

Note: This different routine is necessary due to the higher hydraulic fluid volume of the larger cylinder. The volume in the pressure converter limits the hydraulic stroke of the cylinder to 10mm.

Therefore, the pneumatic “wafer bow/ hydraulic down” function has to be used to bring the top-heater down to a maximum separation of 10mm, from there the hydraulic can go ahead and apply force.

In fact this means that the stack height should never be set higher than stack-thickness +10mm

Check schematics 2.1.2 for details.

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Tech tips

hydraulic-cylinders with wafer bow unit:

Never set the stack-height above 20mm and execute a piston down.

Otherwise there could be force transferred on the pneumatic-cylinder piston rod and causing the “predetermined break point” to break.

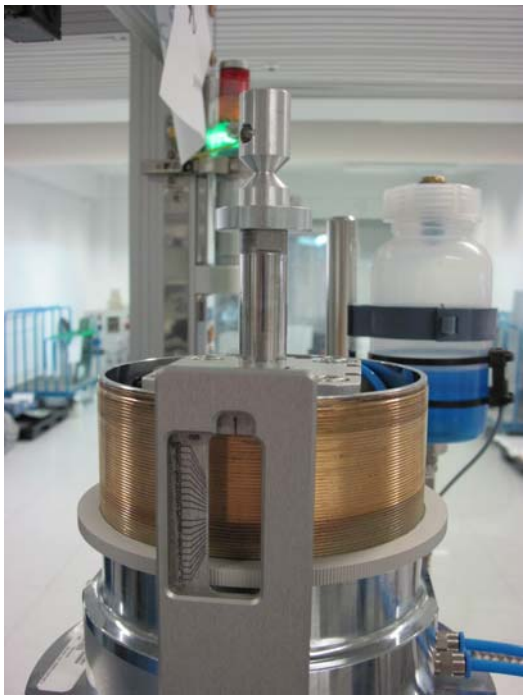

Figure 49 - Hydraulic cylinders with wafer bow unit

Part# for predetermined break point: 10032896

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load-cell (if equipped):

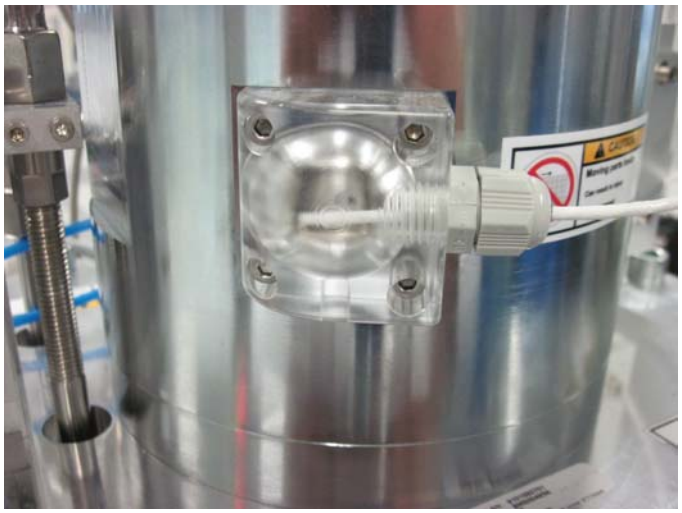

Figure 50 - Load Cell

Check through the plexi-glass window and make sure the cable can move free during any piston-motion.

loadcell test:

Prior to doing the loadcell test, make sure the wafer bow is adjusted so that it doesn't touch the loadcells after executing the "wafer bow" command.

There should be no force reading on the loadcells after "wafer bow".

If there is force, adjust the wafer bow-ring up higher or (on systems without wafer bow)

Set the top ring higher (loose the 3 screws on the outer perimeter and shift the ring higher)

The normal gap is 1-2mm (between loadcells and pressure disc) after "wafer bow" was set.

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4.4 High Voltage

Any use by unauthorized personnel or careless handling may increase the potential danger.

Figure 51 - Caution! Hazardous Voltage

To check the function of the high voltage power supply the cover must be closed!

1) Enter a Voltage setpoint and Current limit in the Voltage window and press OK.

2) Compare the setpoint value with the displayed value in the Voltage window.

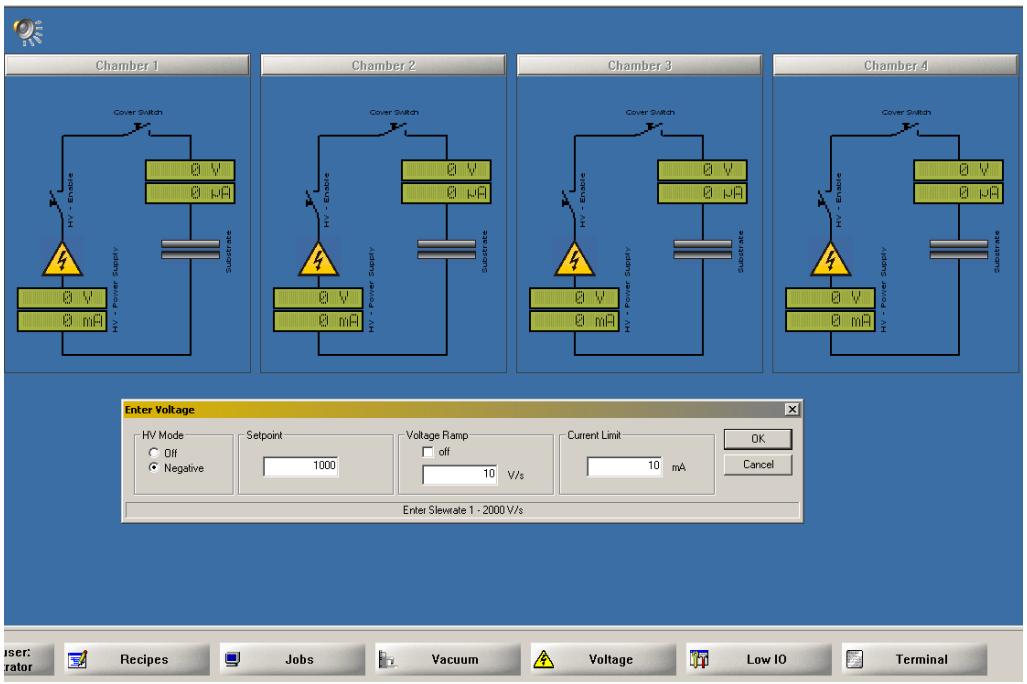

Figure 52 - Voltage

For the high voltage specification refer to the Acceptance Test Protocol.

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4.5 Cover Clamps

Check the pneumatic connection of the cover clamps for cracks and leakages.

Check that the sensors on the clamps are tightened.

Figure 53 - Clamps

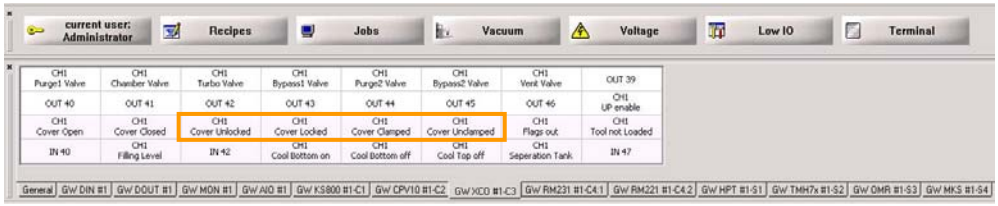
Check that the four clamps on each chamber are closed and locked well and if they open smooth again.

Check the inputs in the Low IO, Chamber x „GW XCO #1-C3“:

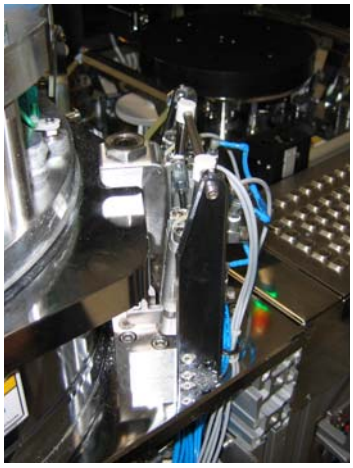
Status will become green when the input is present.

Endswitches are in series for:

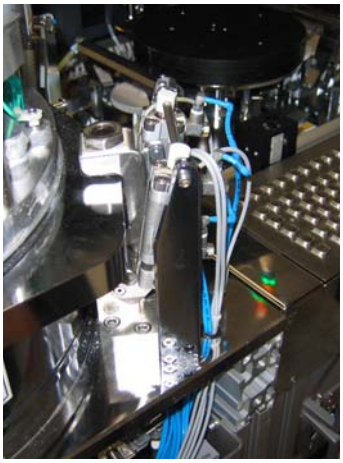
- Cover unlocked
- Cover locked
- Cover unclamped
- Cover clamped



Status of the cover clamps:

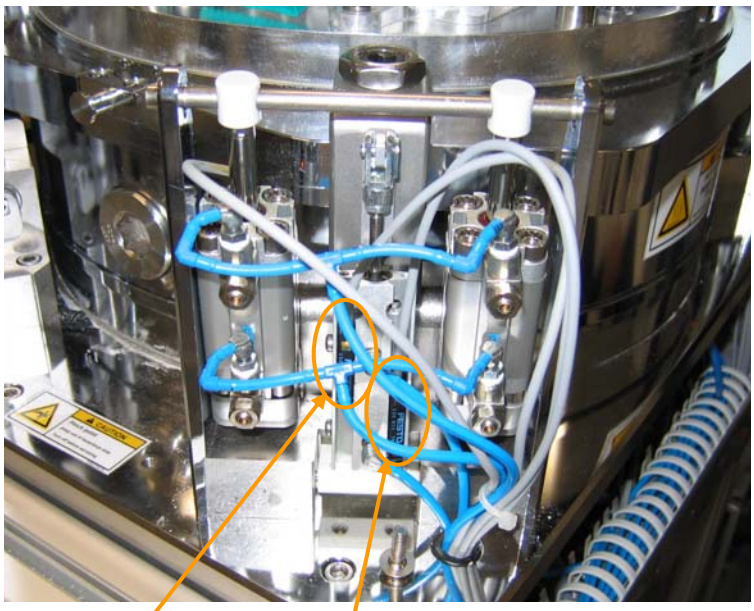


clamped and locked

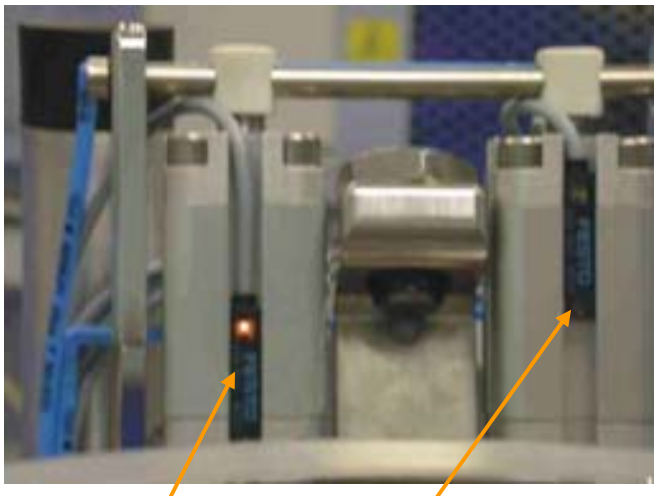


unclamped and locked

unclamped and unlocked



Cover locked, Cover unlocked end switch



Cover unclamped, Cover clamped end switch

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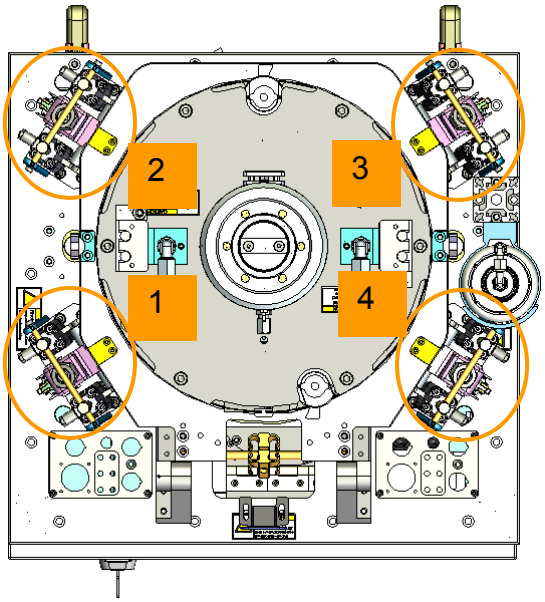
The end switches are wired in series (from cover clamp 1 -> 4). If one end switch is not adjusted the input is missing in the software.



4.5.1 Working principle

Cover locking mechanism consists of locking clamp (c-hook), which is pivoted on an eccentric shaft. Attached to this eccentric shaft there are two locking levers.

Once locking clamp is in lock position, eccentric shaft is twisted by applying force to the locking levers. This moves the pivot point further more down and pulls the claps respectively the cover down by a certain stroke.

Locking levers are pushed over the dead center this prevents clamp to pulled open under load. Stroke can be adjusted by tilt of locking levers. Setscrews can adjust tilt of the locking levers. Ball thrust screws on top of the c-hook adjust pre-load.

Pneumatic cylinders initiate movements.

We are talking about locking cylinder - moves locking clamp (c-hook) from or towards the cover. The clamping cylinders apply the torque via the locking levers to the eccentric shaft.

Proximity switches indicating covers locked/unlocked and cover clamped/unclamped monitor each movement

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4.6 Wafer Bow

4.6.1 Adjust Wafer Bow Pin

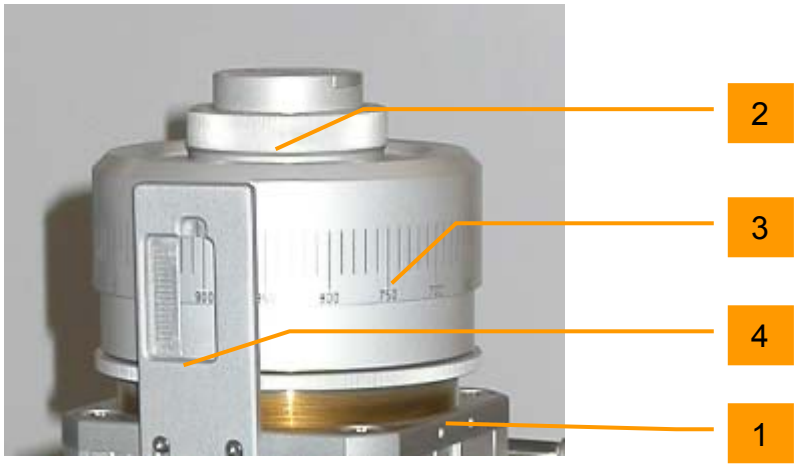

Figure 54 - Overview Wafer Bow Scale

1	Locking Hub
2	Adjustment wheel with scale
3	Scale for find adjustment
4	Scale for coarse adjustment

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1) Prepare wafer bow pin calibration tool

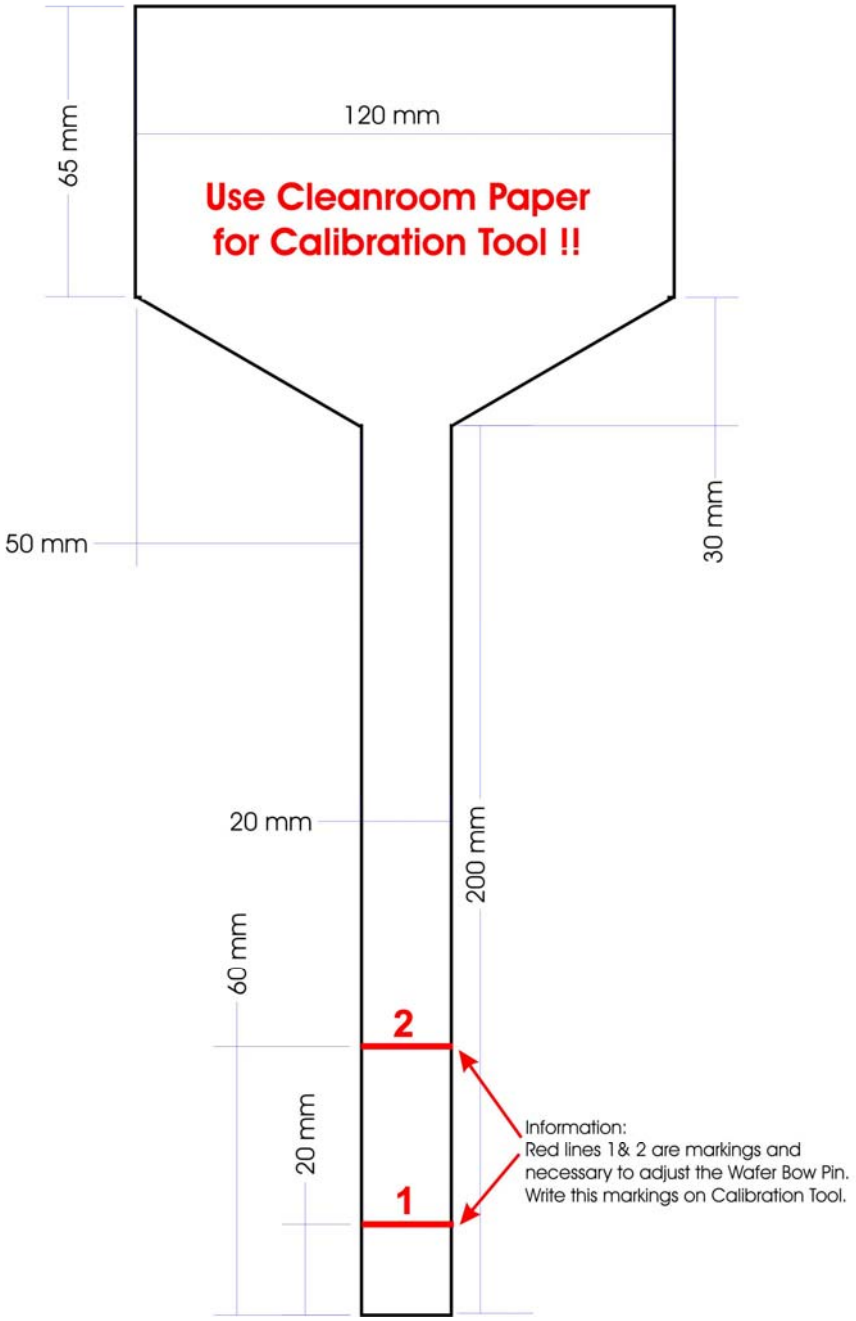

Figure 55 - Wafer Bow Pin Calibration Tool

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2) Prepare bond chamber

3) Load bond chuck

4) Remove blanking flange on bond cover.

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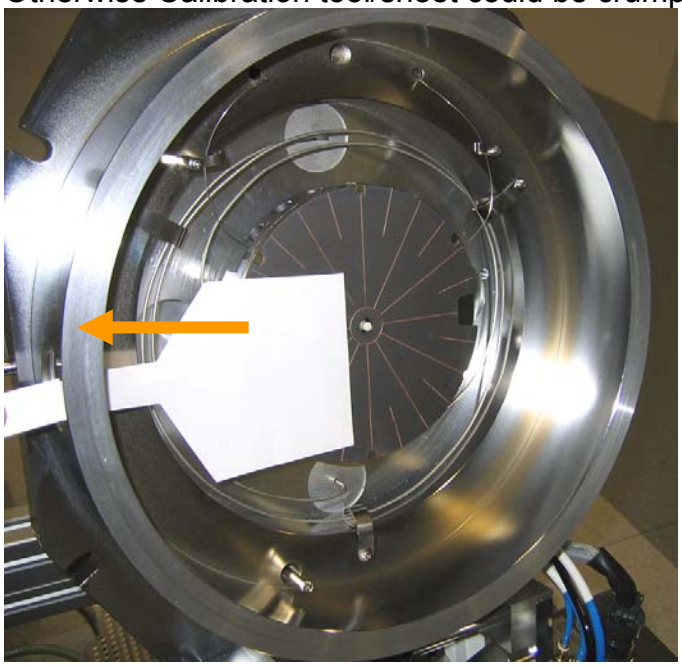
5) Open Cover and insert Calibration Tool in opening. (Second person shout hold the Calibration Tool/sheet with soft tension. Otherwise Calibration tool/sheet could be crumpled)



6) Close bond cover.

7) Adjust calibration sheet to marking 1.

4.6.1.1 Check correct adjustment

- Set the stack height to 500µm.
- Activate wafer bow and pull out the paper strip. It should be possible to pull it out slightly.
- When setting stack height to 450µm, the paper should be clamped, at 550µm it should be loosen.

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Wafer bow overlap: 3mm (use a depth gauge to check!)

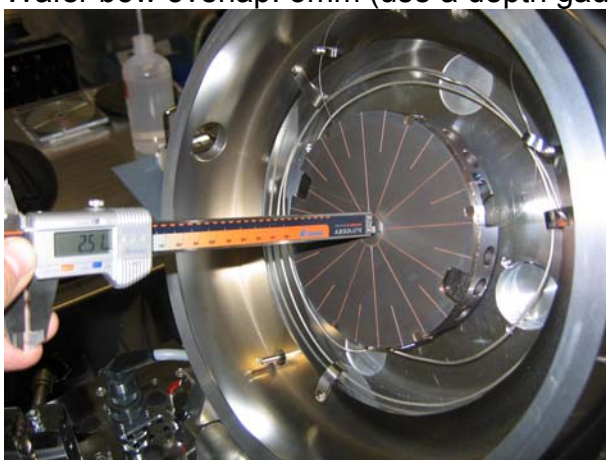
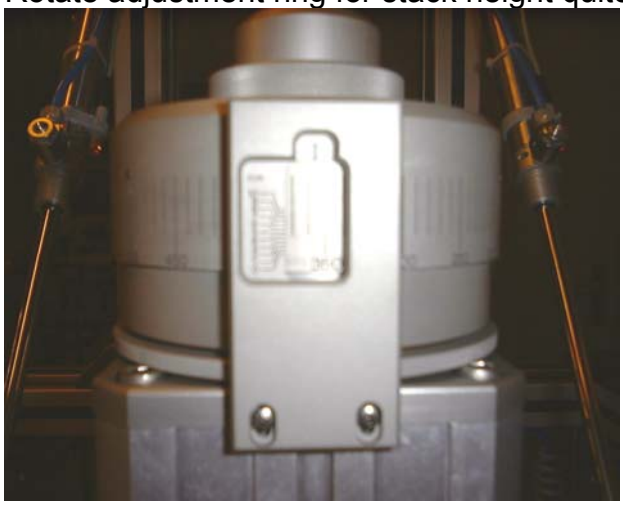


Figure 56 - Check Wafer Bow overlap

4.6.1.2 Adjust wafer bow pin

1) Rotate adjustment ring for stack height quite to the bottom



2) Activate wafer bow and pull at the paper strip. If it is clamped, deactivate wafer bow, rotate the adjustment ring a bit up and activate wafer bow again.

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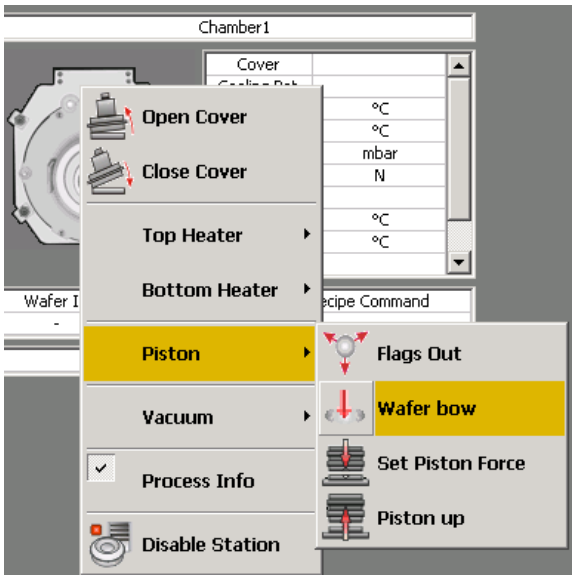
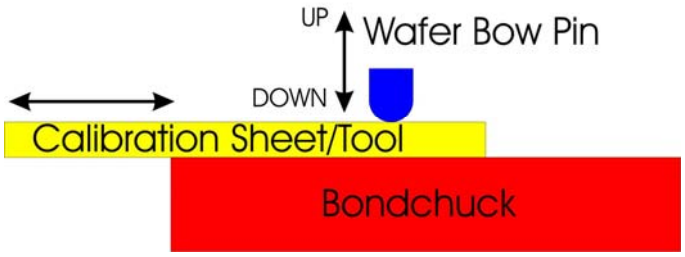
4.6.1.3 CAN System

To activate wafer bow pin press high level command “Wafer Bow Pin”.

To deactivate wafer bow pin press high level command “Piston Up”.



4.6.1.4 Adjustment Calibration Schematic



1) Try until you can pull the strip out slightly (until the bow-pin looses contact to the paper strip → Wafer bow – zero contact.

It may be necessary to rotate the adjustment ring for- and backwards until you have found the exact zero-contact position.

2) Rotate the adjustment ring 500µ down (turn right).

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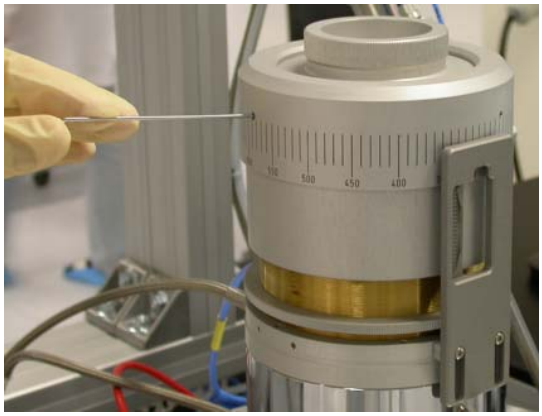
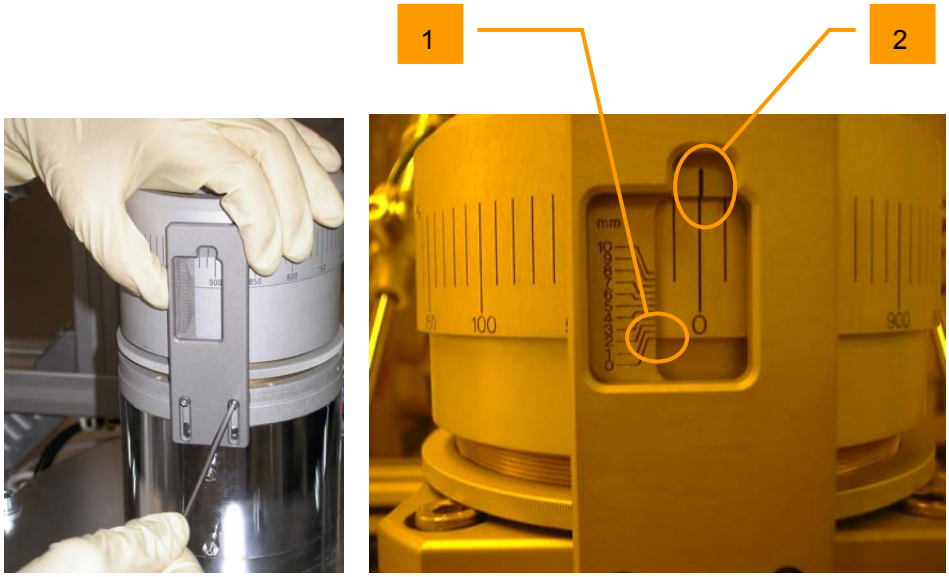
3) Open the 3 setscrews on the adjustment ring hold the bottom-part of the adjustment ring and just rotate the scale. “0” must appear on front.



4) After that loosen the 2 screws in front (screws which hold the millimeter ruler) and set the ruler to “0” position.



1	Coarse zero (edge – zero)
2	Fine zero

5) Check Wafer Bow Pin adjustment:

6) End of instruction

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4.7 Uniformity Check

4.7.1 Pressure Film Test

Needed equipment:

- 2 SI Wafer with blank surface
- Pressure film Ultra Low 13,1' 28-85PSI
- Bondchuck

Figure 57 - Needed Equipment

For the pressure film test two different pressure films are necessary, one more clear and one white film.

Cut out one peace of each pressure film that has the same size than the wafer. Now place first a wafer and than the white pressure film (blue bag) on the bond chuck. The harsh side of the pressure film up. Next place the more clear pressure film (black bag) with the harsh side down on the chuck, so that the harsh sides of the pressure films are in contact.

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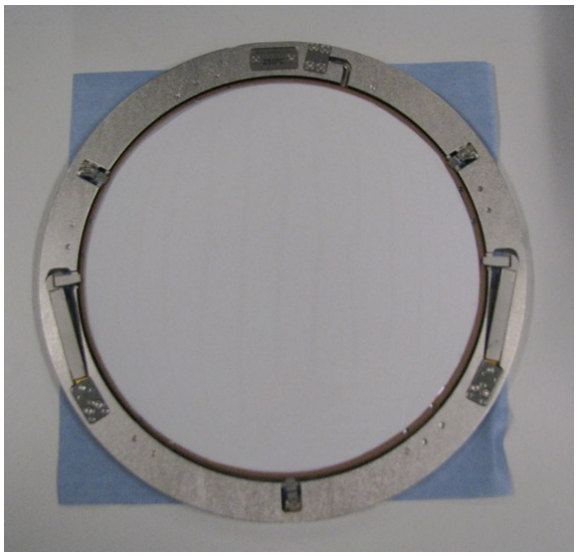

Figure 58 - SI Wafer - Pressure Films – Chuck

Finally place the second SI Wafer on the chuck and clamp the wafer stack with the pressure film in between.

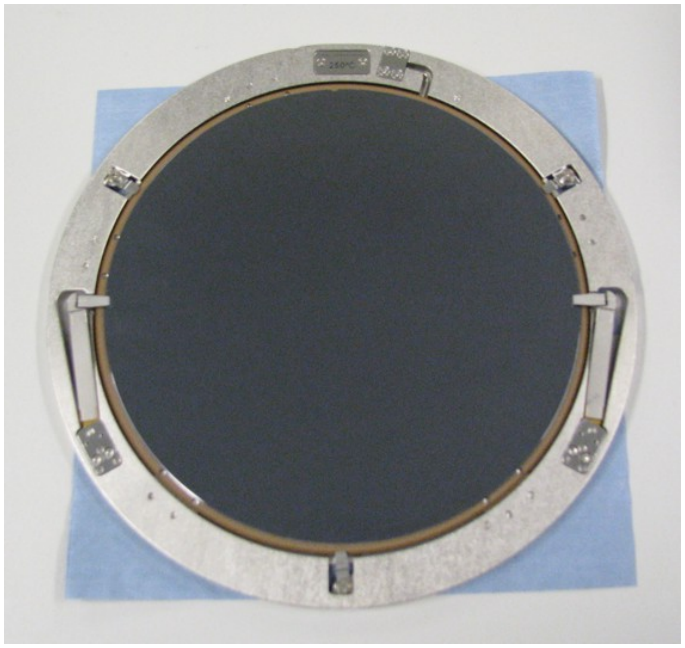

Figure 59 - SI Wafer

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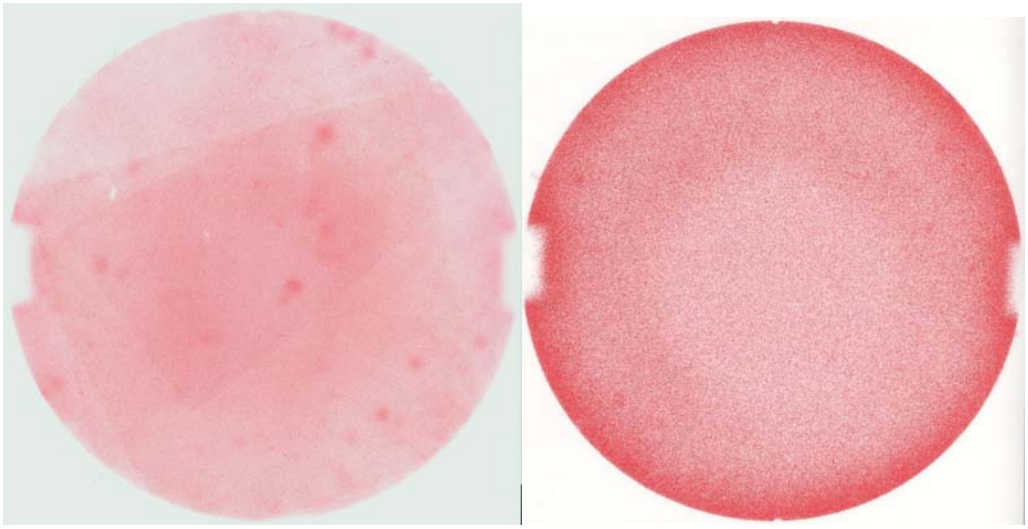

Figure 60 - Pressure Film Test Result

Place the bond chuck in the chamber and apply a piston force according to the table below. After 30sec of delay release the piston force and remove the tool from chamber. Unclamp the substrate manually and remove the top wafer + top pressure film carefully. You can see the result of the pressure film test on the bottom pressure film.

Required Contact Force for Pressure Film 28 – 85PSI (19,31 – 58,61N/cm²)

Wafersize	100mm	150mm	200mm	300mm
min. Contact Force	1525N	3400	6060	13650
max. Contact Force	4600N	10400	18500	41600

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4.7.2 Check Flatness

Check the flatness of the Pressure Insert and the Bond Chuck with a straight edge. Make sure that the surface is absolutely even and no spots are visible.

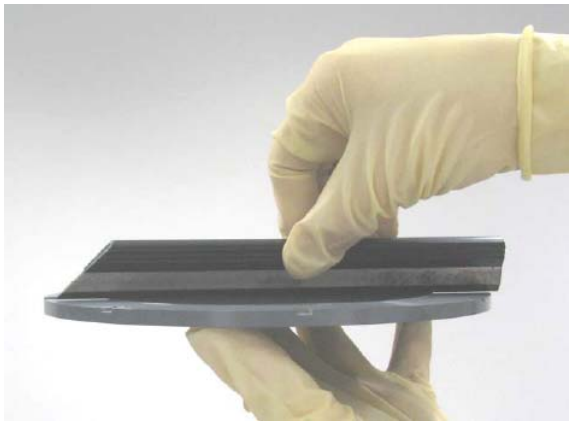
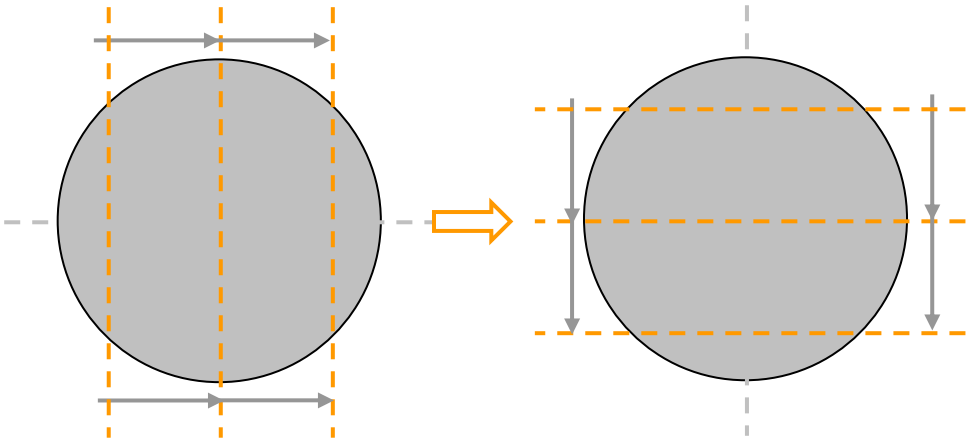


Figure 61 - Flat Bond Tool

In order to check the flatness of a bond chuck accurately, check the flatness two times in a 90° angle.

When checking the flatness make sure to check it on the whole surface by moving the straight edge over the surface like shown below:



Note: If the flatness is only checked once the result could be inaccurate.

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4.7.3 Heater Flatness

4.7.3.1 Bottom Heater

Make a visual check of the Heaters. Check the flatness of the heater with a straight edge and a feeler gauge.

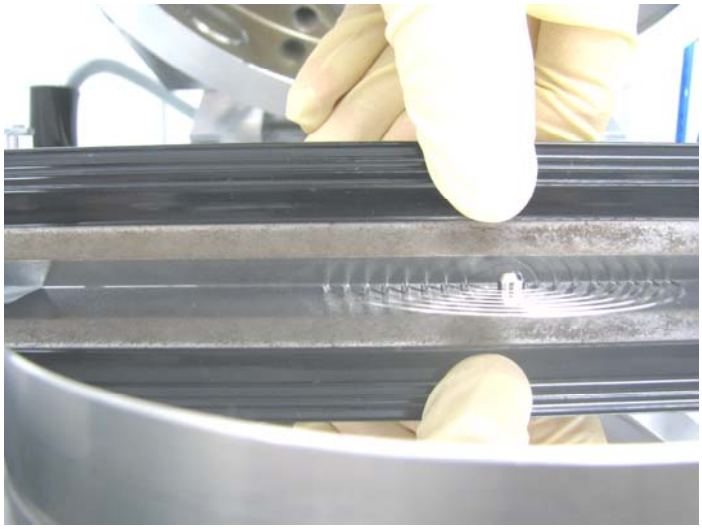

Figure 62 - Bottom Heater

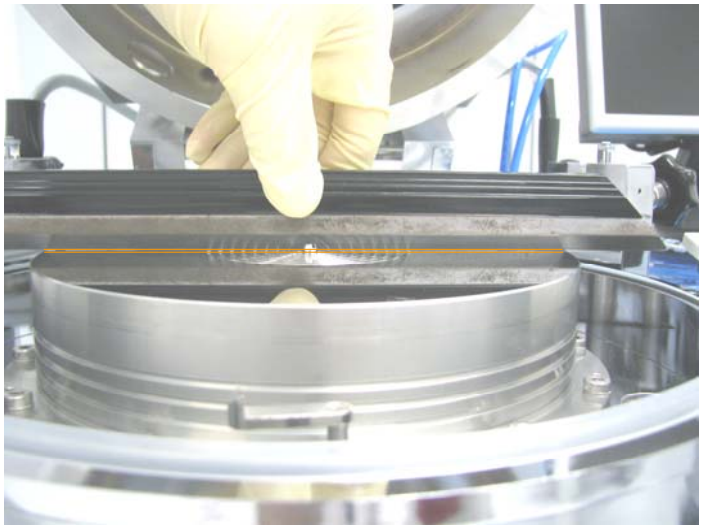

Figure 63 - Bottom Heater

As seen below there is a gap (1) between the heater and the straight edge.

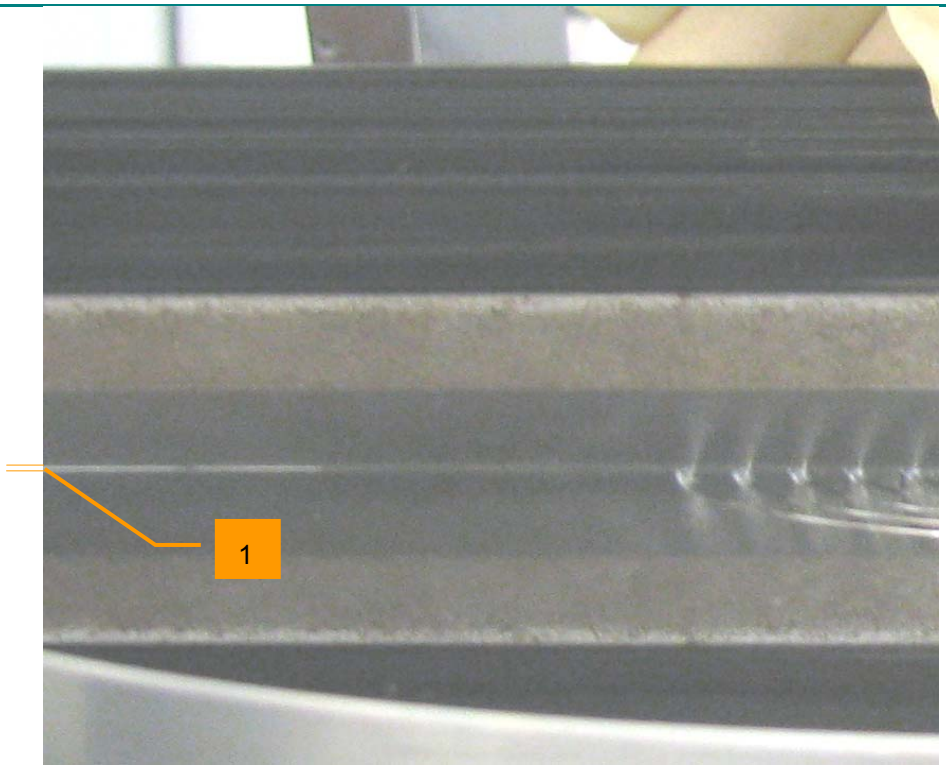

Figure 64 - Bottom Heater

The gap between the heater and the straight edge can be measured with feeler gauges and a measuring gap (see below).

feeler gauges

measuring gap

Note: Standard factory setting is 10 to 15µm concave. The setting of the heating chuck depends on the process and can vary!

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4.7.3.2 Top Heater

Make a visual check of the top heater.

Check the flatness of the heater with a straight edge. Make sure that there is no gap between the top heater and the straight edge.

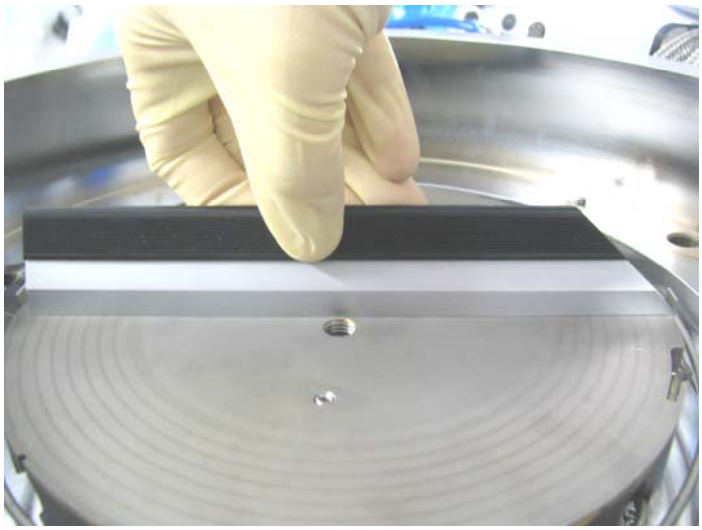

Figure 65 - Top Heater

4.7.4 Bond Tool Flatness

Check the flatness of the bond chuck insert with a straight edge.

Make sure that the surface is absolutely even and no spots are visible.

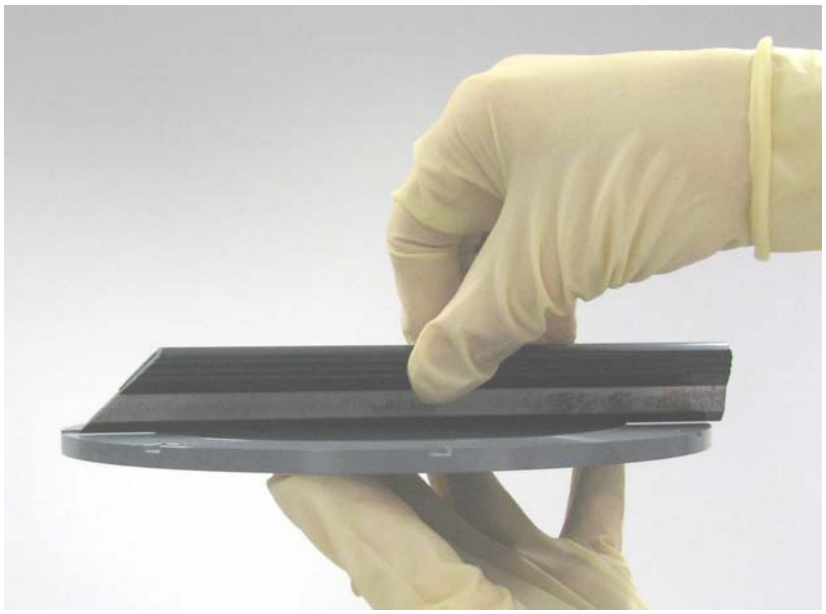

Figure 66 - Bond Chuck

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4.7.5 Compliant Layer Graphite 6”

Make a visual check of the compliant layer graphite. Make sure that the surface is absolutely even and no spots are visible.

Figure 67 - Compliant Layer Graphite 6"

Note: The compliant layer graphite should be exchanged annually!

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4.8 Flag Pulling Mechanism

Manually activate the flag pulling mechanism:

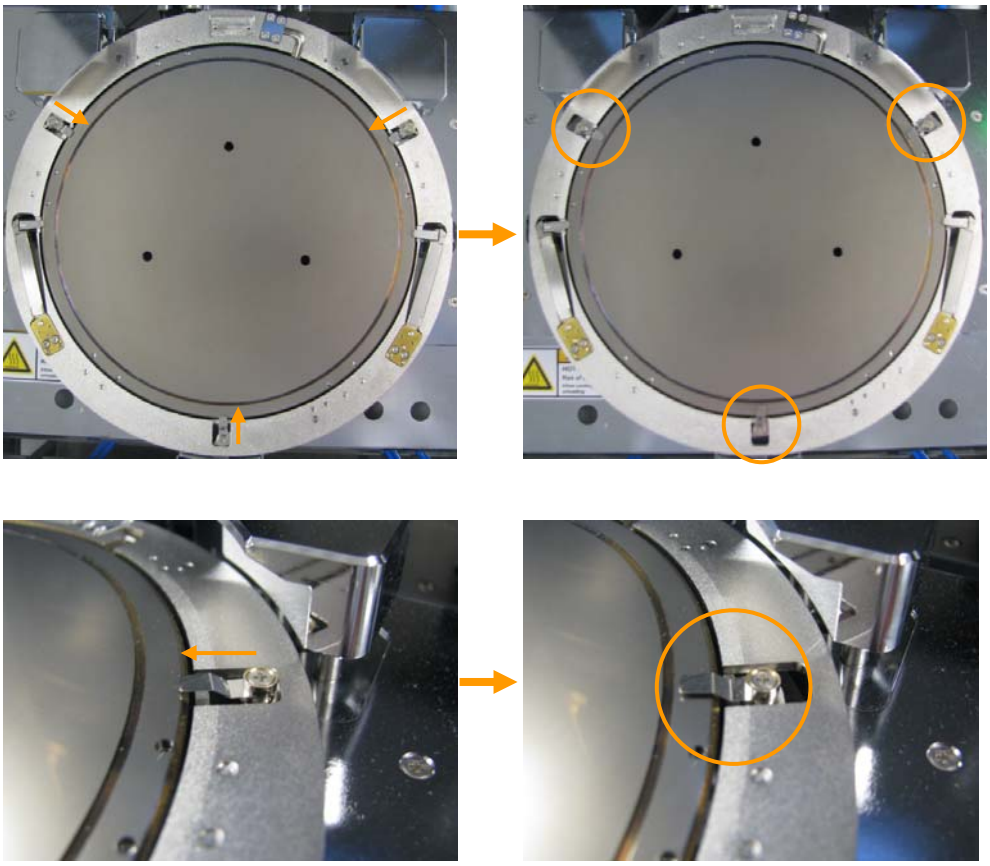

Figure 68 - Flags on Bond Tool

Ensure that the flag pulling mechanism is working smoothly, and that there is no debris that might cause a flag to fail. There shouldn't be any cracked waferpieces in the bellow of the pulling mechanism.

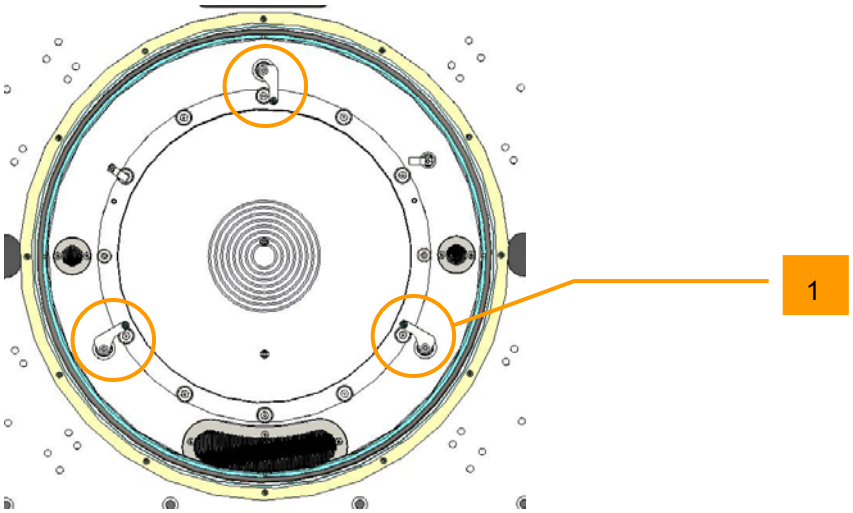

Figure 69 – Bellows

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4.8.1 Adjustment of Flags

Perform the following steps for all three flags:

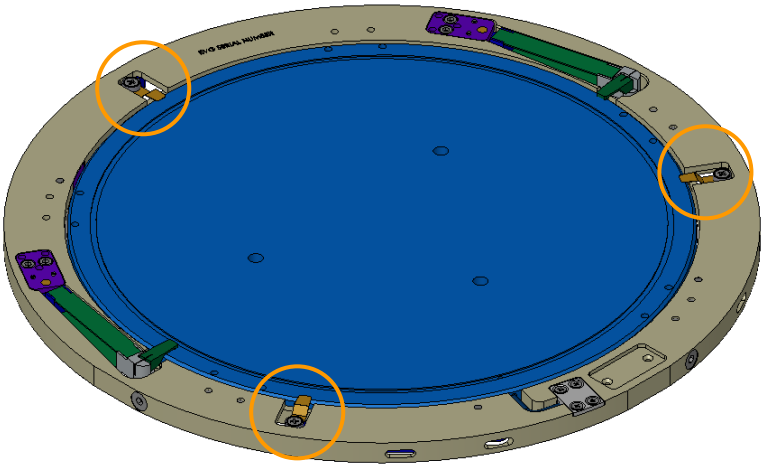

Figure 70 - Flag on Bond Tool

Place a wafer (e.g. a piece of broken wafer) between the bond tool surface and the flag.

4.8.1.1 Flag Height

There should be a gap (1) between the wafer (2) and the flag (3):

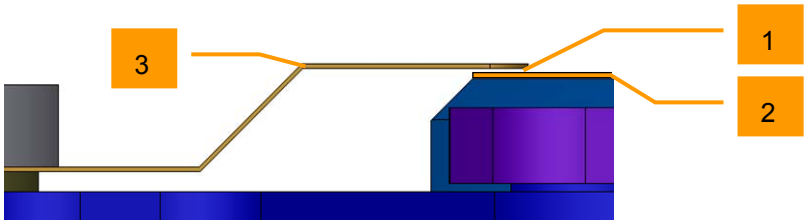

Figure 71 - Flag Height

If necessary the flag height can be adjusted by tightening or loosening the screw on top and on bottom of the flag:

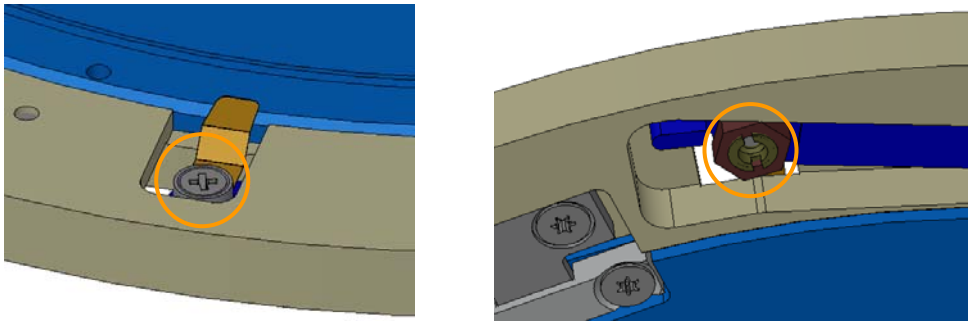

Figure 72 - Flag Height Adjustment Screws

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4.8.1.2 Flag Orientation

Make sure that the front end of the flag (1) is slightly higher than the other end of the flag (2) to prevent the flag from being twisted.

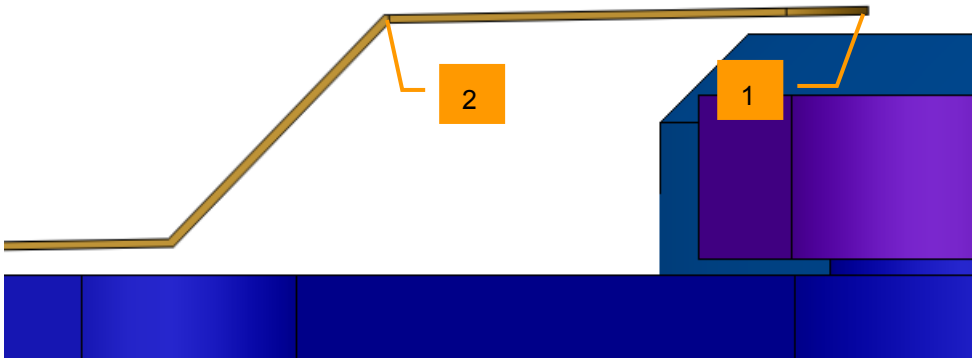

Figure 73 - Flag Orientation

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4.9 Pressure Insert

Required tools:

Figure 74 - Compliant Layer Graphite 6”

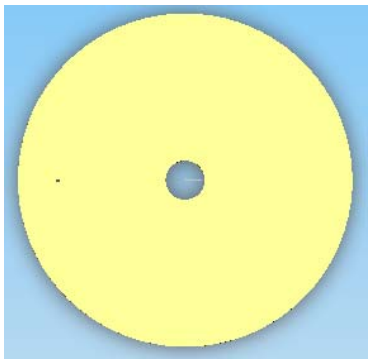

Figure 75 - Compliant Layer Graphite 4”

Figure 76 - Pressure Disc with Compliant Layer Graphite

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Replace the compliant graphite foils of the pressure disc:

1) If the System is an EVG520IS bring the Cover to Service Position first (remove the perforated plate “Covering top back” and bring the Cover into its service position).
2) Remove 5 pieces pressure disc clamps
3) Remove Pressure Disc
4) Remove carefully the two “Compliant Layer Graphite” (Number “1” and “3” in following drawing. It’s recommended to change both “Compliant Layer Graphite” because of evenness.)

Note: Contamination! Thermocouple!

5) Mount new Compliant Layer Graphite and fix Thermocouple.

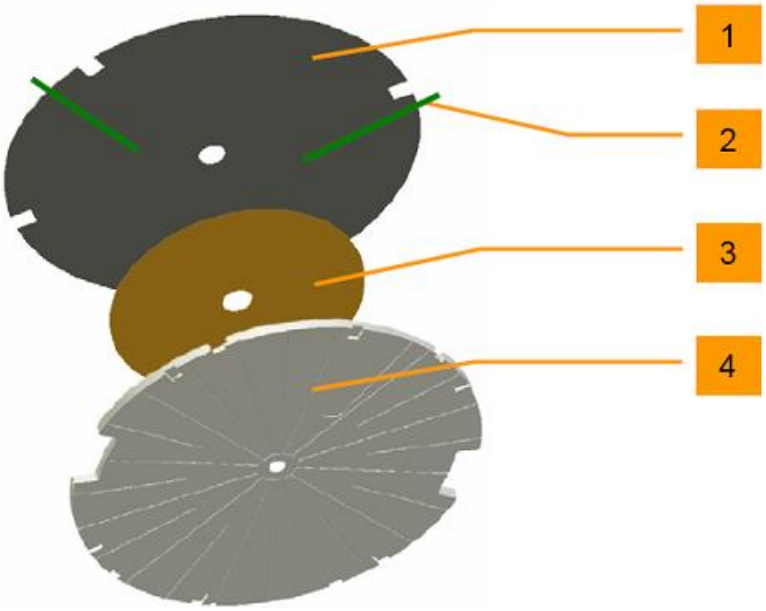

Figure 77

1	**Compliant Layer Graphite 6”/8”/12” (depends on the machine)**
2	**Thermocouples (2 pieces)** – The two Thermocouples must be placed between the two “Compliant Layers Graphite”!
3	**Compliant Layer Graphite** – Most time the two “Compliant Layers Graphite” do have the same size. If not place the smaller Graphite-Disc (Number “3” in drawing above) exact in the middle of the “Pressure Disc” (A little bit of Isopropanol can help you with that). **The smaller “Graphite Discs” are used for special “Pressure Discs” only.**
4	**Pressure Disc**

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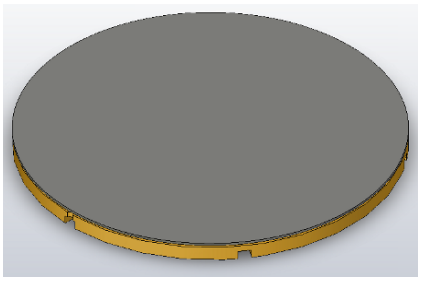
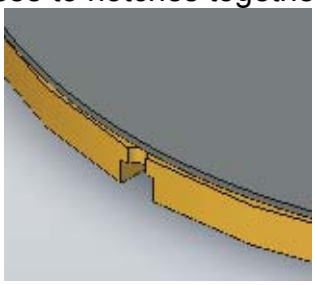
6) Fix New Compliant Layer Graphite and Quartz Glass Pressure Disc with pressure disc clamps

Adjustment:
There is a notch on the side of the pressure disc (pictures below) and a notch on the heater. Align these to notches together!





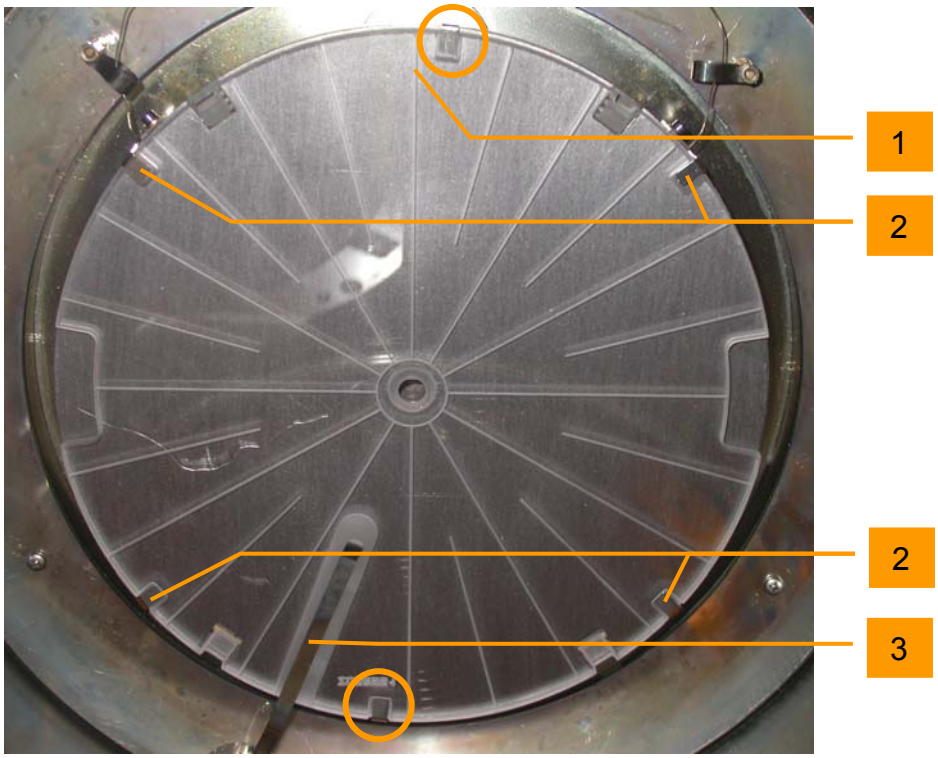


Figure 78

1	If there is no notch on the side of the disc the notch above the disc must be exact in one line to the screw above / beneath.
2	
3	Notch for electrode. If there is no notch remove the electrode.
4	Flattened side
5	Thermocouple
6	Pressure disc clamps
7	Flattened side

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Remove disc: It is easier to remove the four red marked clamps by using a small screwdriver first. The disc is still fixed by the two blue marked clamps (Figure 78) now.

Mount disc in reverse order.

There is a flattened side and a spring side on the clamp. Fix the disc with the flattened side (Figure 80 - Fix disc).

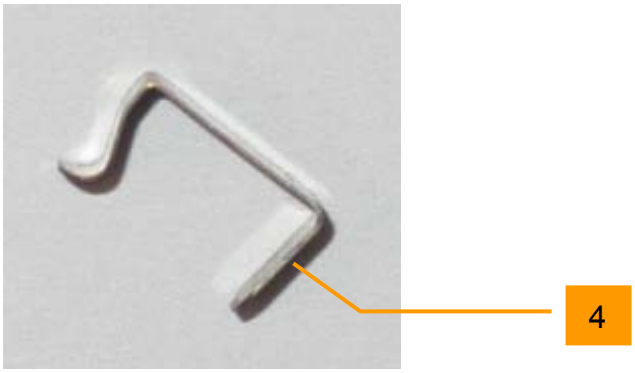

Figure 79 - Clamp

Probably it is necessary to readjust the tension the spring side of the clamp if it is loosely.

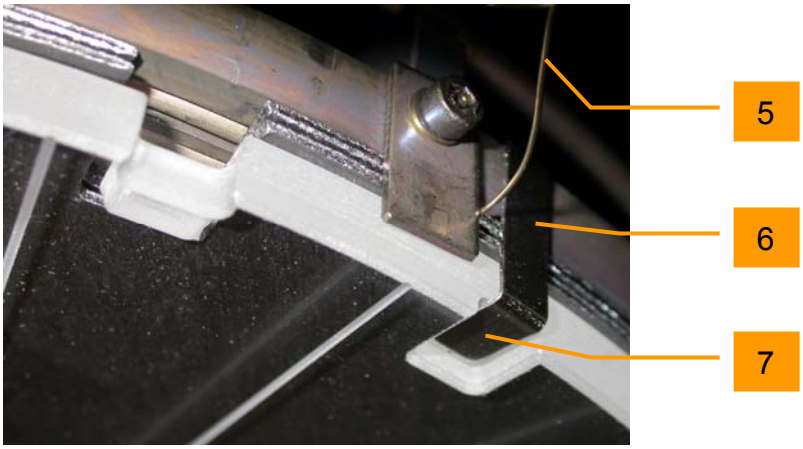

Figure 80 - Fix disc

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4.9.1 Adjustment of Pressure Disc

Adjust the pressure disc as shown in Figure 81 and Figure 82.

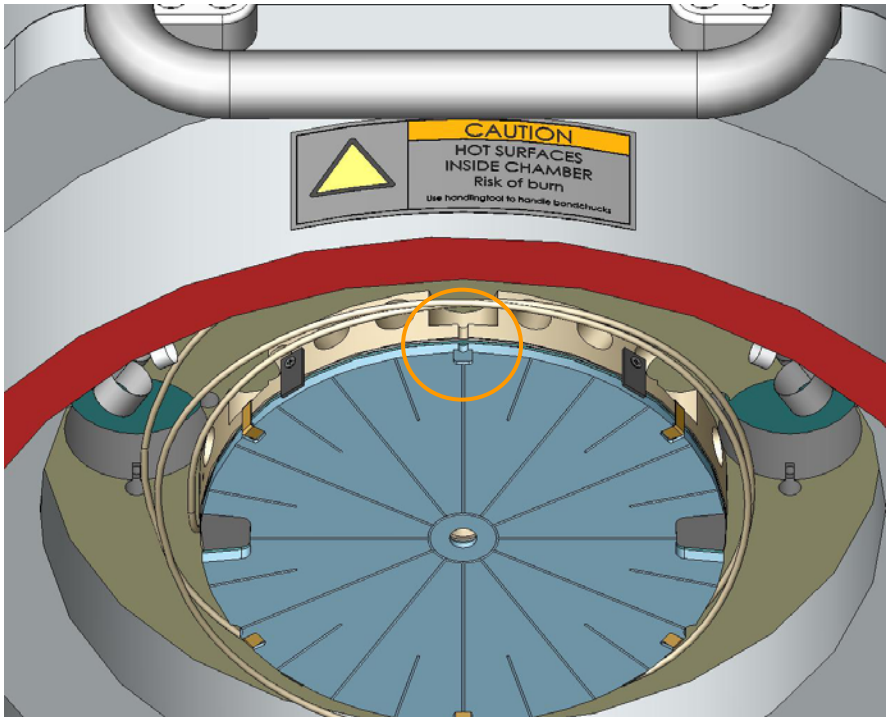

Figure 81

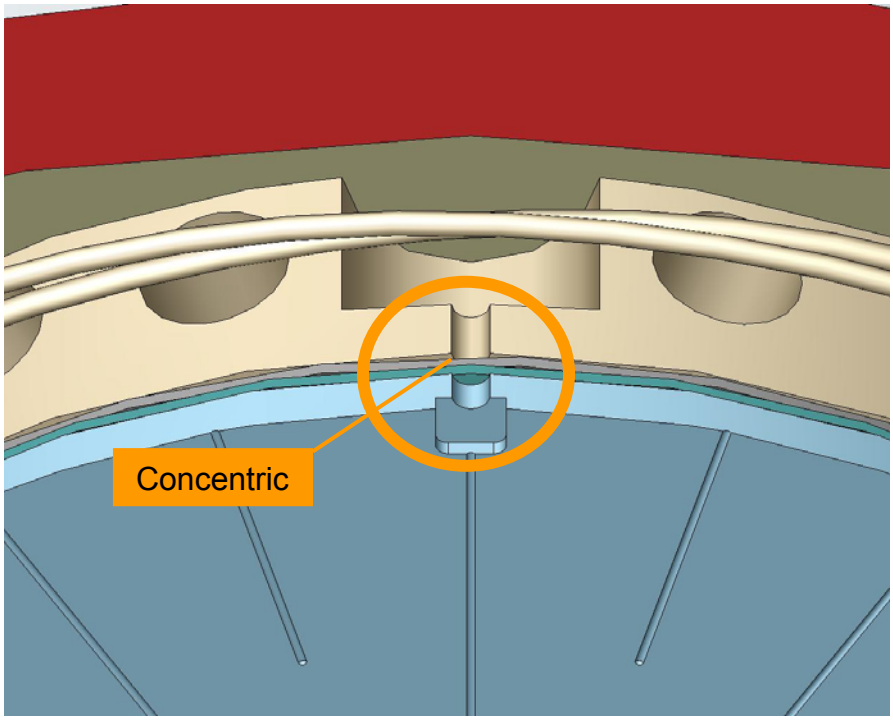

Figure 82

Make a visual check of the top side pressure glass. There should be no crack or spot detectable.

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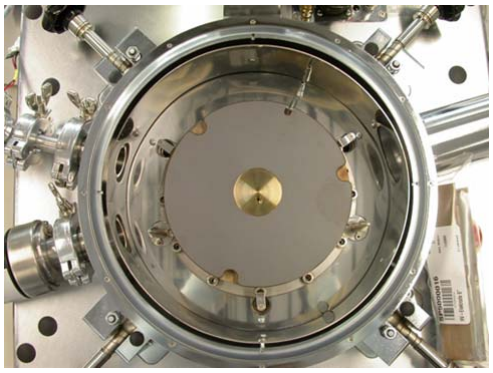
4.10 Cleaning

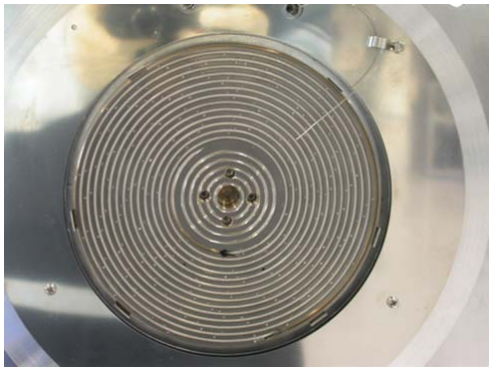
For all cleaning processes the entire EVG5xx system must be switched off, and the heater temperature has to be below 50°C. Alcohol and a wipe suitable for clean rooms can be used for all cleaning actions.

Clean all bottom heating chucks of bond chamber with alcohol.

Clean the pressure disk of the top heater of pressure lids.

(Example 6”)





4.11 Turbo Pump – Vacuum System

The following Turbo Pumps are used on the EVG5xx systems (depends on vacuum system configuration).

4.11.1 Pfeifer – THM07x

1) Check the actual speed of the turbot pump in the LOW I/O: “GW TMH7x”.
   Turbo Pump must be in idle mode.
   6 & 8inch System: 1500Hz
   12inch System: 1000Hz

2) Check the motor current
   Turbo pump must be in idle mode. Motor current should be below 1A.
   Low I/O “GW TMH7x”

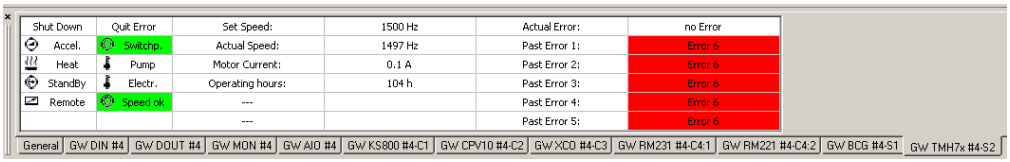


Figure 83 - Low I/O

3) Check the fan on the turbo pump.
   A defective fan can result in malfunction of the turbo pump.

4) Replace the lubricant reservoir.

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7. Maintenance

PLEASE NOTE

No liability for personal injury nor material damage will be accepted for damages and operational interruptions which have been caused by improper maintenance; in addition, all guarantees become invalid.

- You can change the lubricant reservoir yourself (please see Section 7.1.).
- Please contact your local Pfeiffer Vacuum service for all other maintenance and service work.

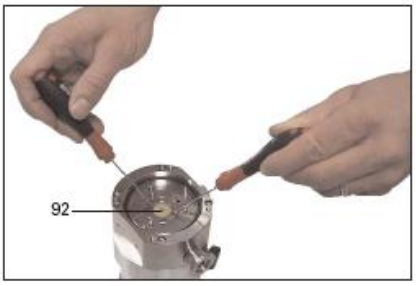
CAUTION

Apply no mechanical stress to the TC 600.

7.1. Replacing The Lubricant Reservoir

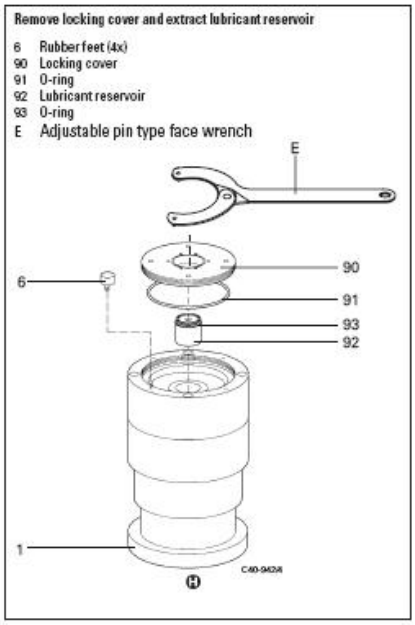
The lubricant reservoir should be replaced at least once a year.
Where extreme operating conditions or unclean processes are involved, the replacement interval should be checked with your Pfeiffer Vacuum Service Center.

- Switch off the turbopump, vent to atmospheric pressure (see Section 4.3.) and allow to cool as necessary.
- If necessary, remove the turbopump from the system.
- Unscrew rubber feet 6 from the underside of the pump.
- Remove the locking cover 90 on the underside of the pump with adjustable pin type face wrench E (order number N 5709 103); take care with the O-ring 91.
- Lever out the lubricant reservoir 92 with the help of two screwdrivers.



WARNING

Lubricant reservoir can contain toxic substances from the medium pumped. Lubricant must be disposed of in accordance with the respective regulations.
Safety instructions data sheet for the lubricant on request.



- Clean off any dirt on the pump and locking cover with a clean, fluff-free cloth.
- Insert new lubricant reservoir 92 **up to the O-ring 93** in the pump.

CAUTION

The lubricant reservoir 92 is already filled with lubricant TL 011; do not add additional lubricant.

- Screw in locking cover 90 with O-ring 91. The lubricant reservoir is brought into the correct axial position with the locking cover.
- Screw the rubber feet 6 back in.

For troubleshooting refer to the OEM manual or contact EV Group.

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4.12 Cooling Lines – Water System

Check the cooling lines for any damage or leakage:

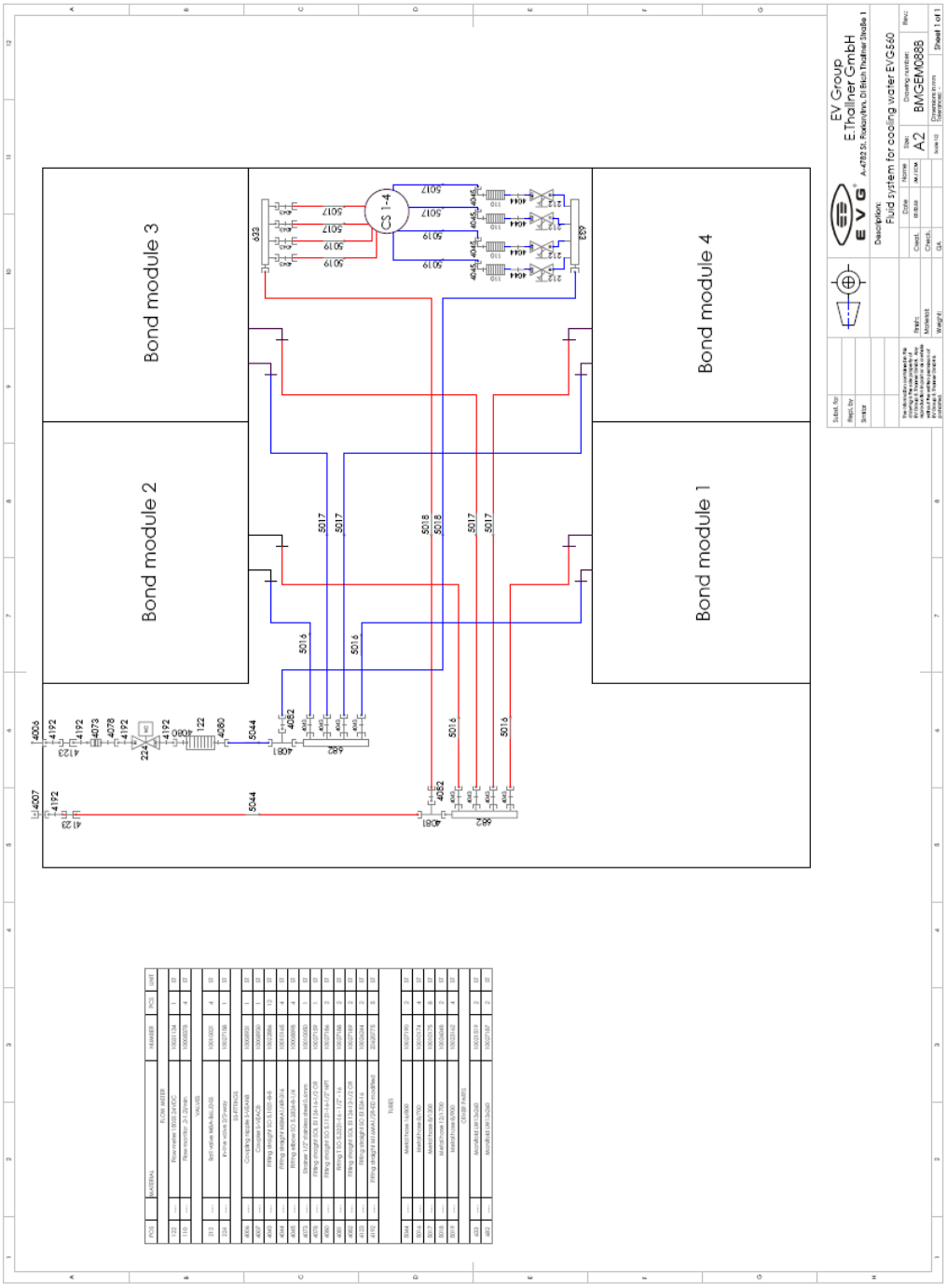

Figure 84 - Water System

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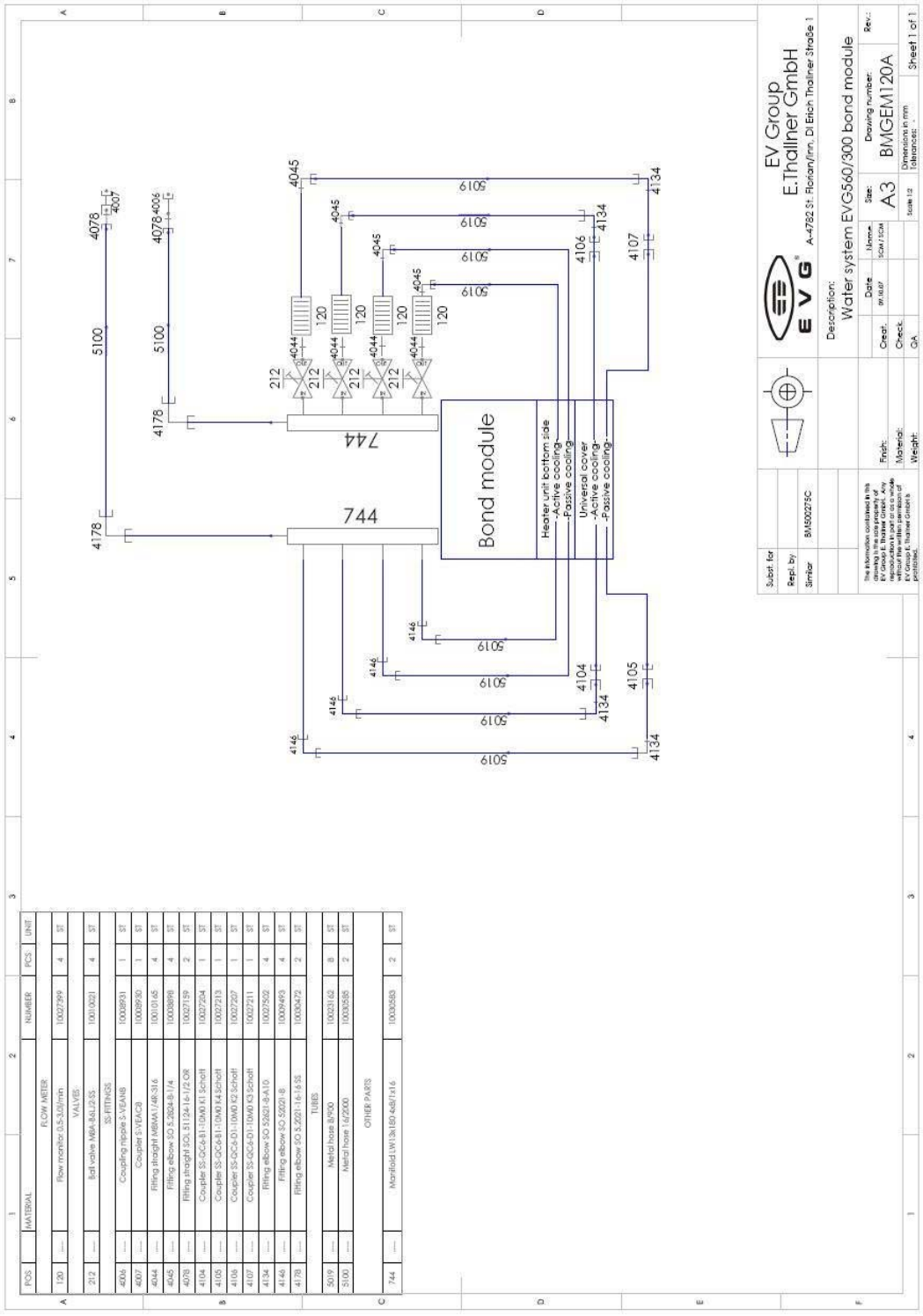

Figure 85 - Water System

4.13 Over Temperature Safety Devices

Disconnecting the thermocouples at these devices must result in an error message and red LED (only Jumo controller) on the device must be on. Heating must not be possible any more.

The device can be reset after reconnecting the thermocouples again and error can be quit.

4.13.1 Reset procedure

4.13.1.1 TB45

Press the two reset buttons simultaneously.

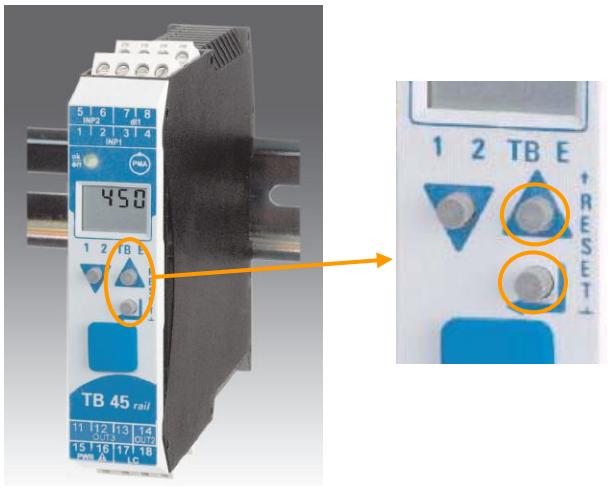

Figure 86 - TB45 - Over Temperature Safety Devices

4.13.1.2 Jumo TB/TW

Press the reset button.

Figure 87 - Jumo TB/TW - Over Temperature Safety Devices

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5 Monthly Maintenance

5.1 Before starting Monthly Maintenance

Perform weekly maintenance as described in the previous chapter.

5.2 Cover connection lines

1) Check all lines (pneumatic, electric and water-cooling) for cracks and damage.
2) Make sure that the water and pneumatic lines are not crimped.

Figure 88 - Cover Connection Lines

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5.3 Tool Detection

Visually check the tool detection.

Position of Tool Detection Sensors (1): The sensors must not be bent or loosen!

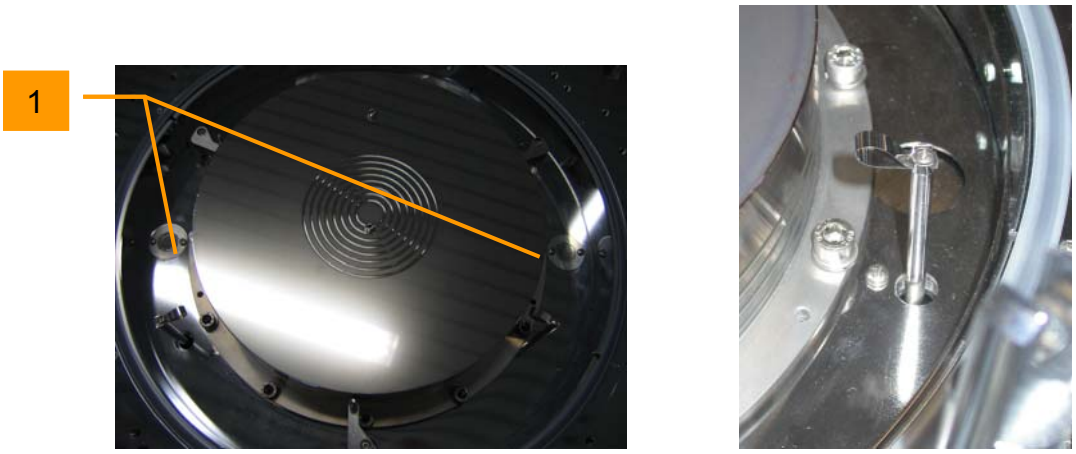

Figure 89 - Tool Detection Sensors

Load a bond-chuck into the chamber and check “Tool not loaded” input in Low IO Chamber x “GW XCO #1-C3.

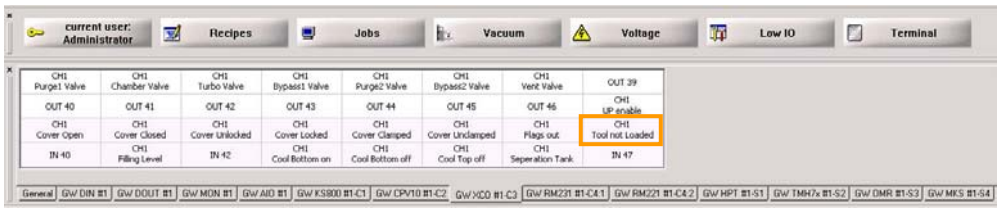

Figure 90 - Tool Detection input

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5.4 Piston Motion

Check the movement of the piston. The motion of the piston has to be smooth and it must fully retract.

5.5 Load Cell Test

5.5.1 Load Cell Test Bond Module

1) Open bond module cover.

Figure 91 - Load Cell Test - Open Bond Cover

2) Remove the screw.

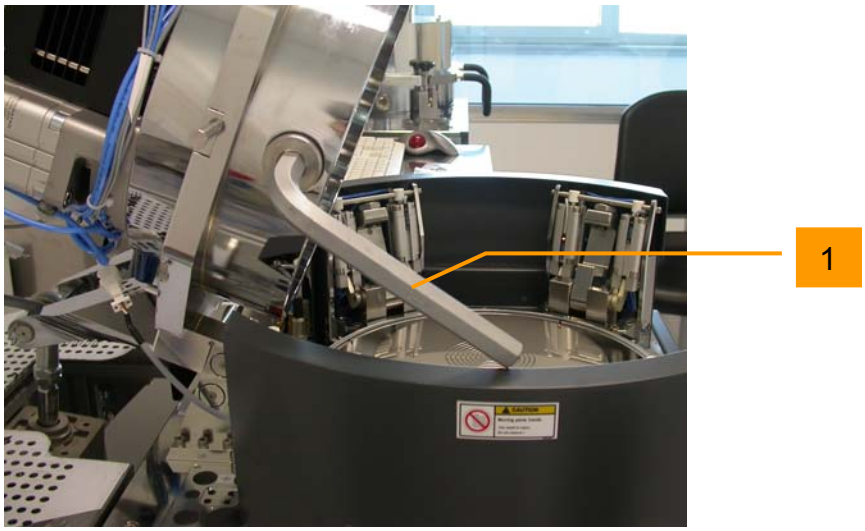

Figure 92 - Remove screw

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3) Put the Load Cells into the chamber (use the adjustment plate) and thread the cables below the hole in the cover as shown in the picture below.

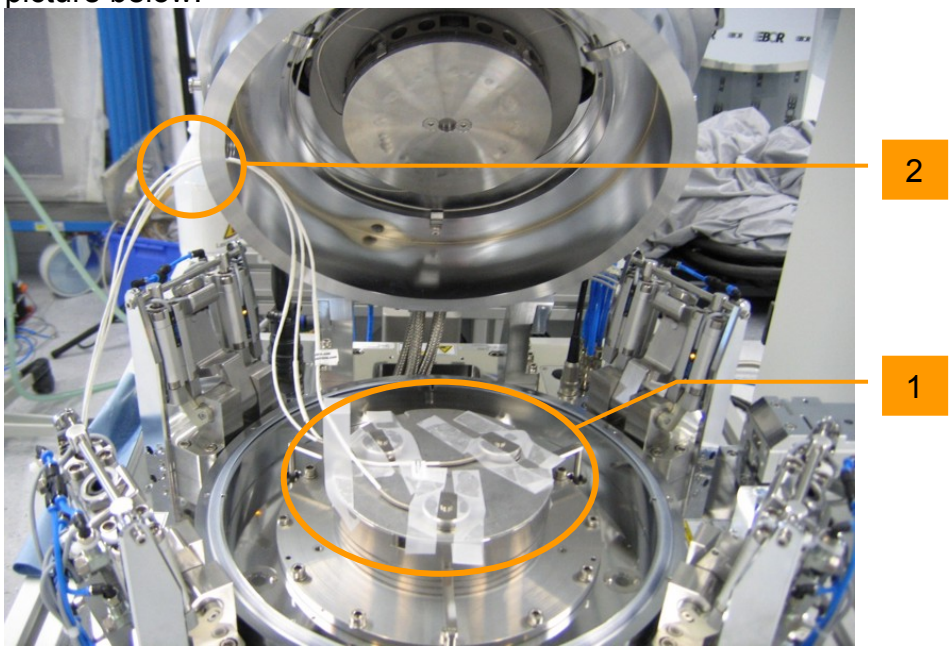
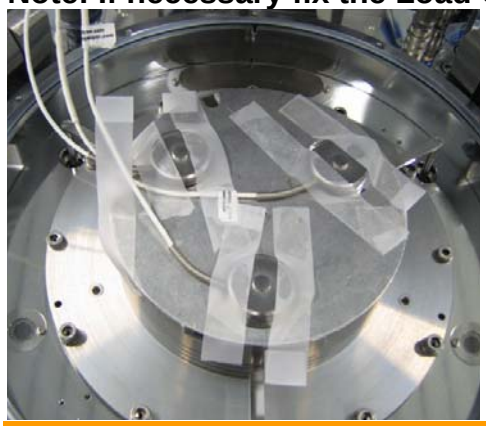


Figure 93

Note: If necessary fix the Load Cells with some tape.



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4) Close the cover. Take care at the threaded cables!

5) Connect the measuring tool (depends on measuring tool).

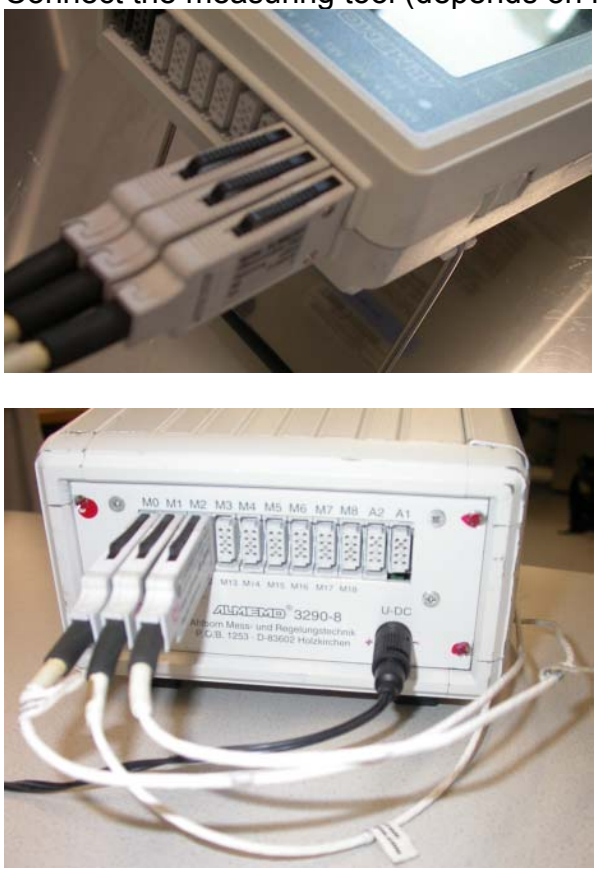

Figure 94 - Load Cell Test - Measuring Tool

6) The display on the measuring tool must look as shown in below (depends on the measuring tool):
If the display looks different press button “P1”.
If measuring tool as shown in item 2 is used press button “CLR” to switch between the different sensors.

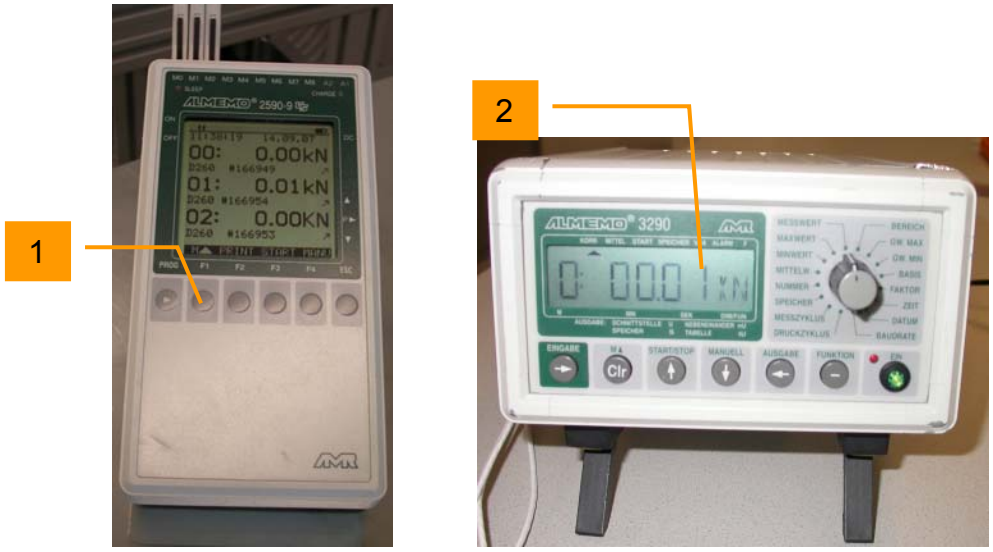

Figure 95

7) Open the “Jobs” –window in the system software. Point with the mouse onto the Chamber –symbol and press left mouse button to open the additional menu for the chamber. Go to “Piston” and press button “Set Piston Force”.

Figure 96 - Load Cell Test - Set Piston Force

8) Enter the force into field “Setpoint” and press “OK” to confirm.

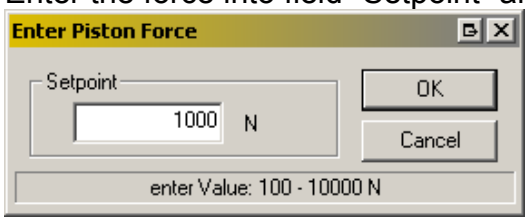

Figure 97 - Load Cell Test - Enter Piston Force

9) Start measurement. Sum up the three values [kN] on the display of the measuring tool and compare with the Setpoint.

10) Remove the measuring gauge and the load cell with caution. Don’t forget to install the screw shown in Figure 93 – Remove screw.

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5.5.2 Load Cell Test UV Bond Module

1) Open bond module cover.

Figure 98 - Load Cell Test - Open Bond Cover

2) Remove the screw.

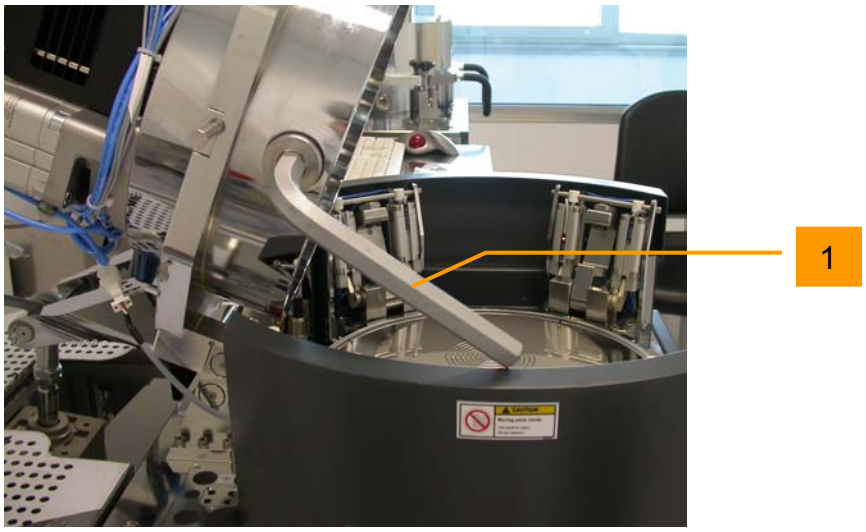

Figure 99 - Remove screw

3) Put the Load Cells into the chamber (use the adjustment plate) and thread the cables below the hole in the cover as shown in the picture below.

Figure 100

Note: If necessary fix the Load Cells with some tape.

4) Insert the transport safety device (or if not available a proper aluminum disk) onto the load cells and put possibly a graphite disk on top of it!

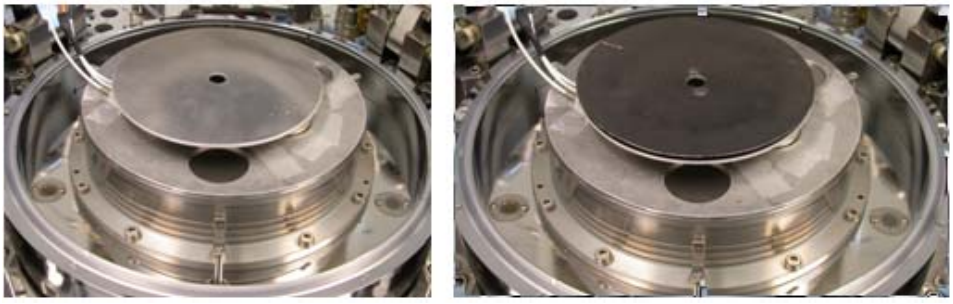

Figure 101

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5) Remove the glass-plate (if installed)

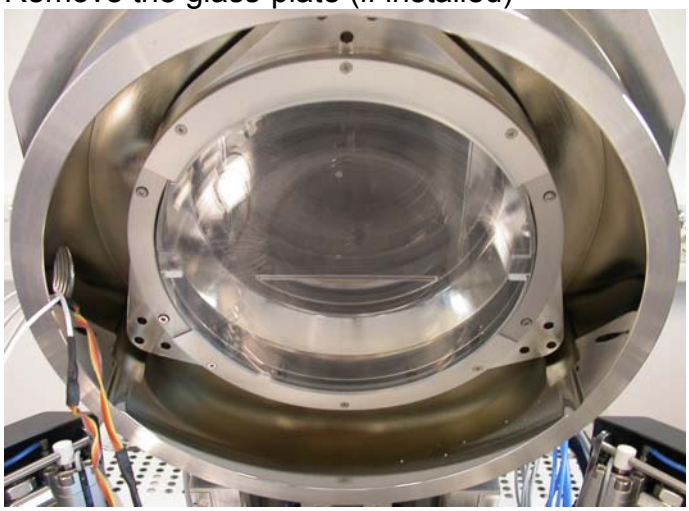

Figure 102 - Remove glass plate

6) Close the cover. Take care at the threaded cables!

7) Connect the measuring tool (depends on measuring tool).

Figure 103 - Load Cell Test - Measuring Tool

8) The display on the measuring tool must look as shown in below (depends on the measuring tool):
If the display looks different press button “P1”.
If measuring tool as shown in item 2 is used press button “CLR” to switch between the different sensors.

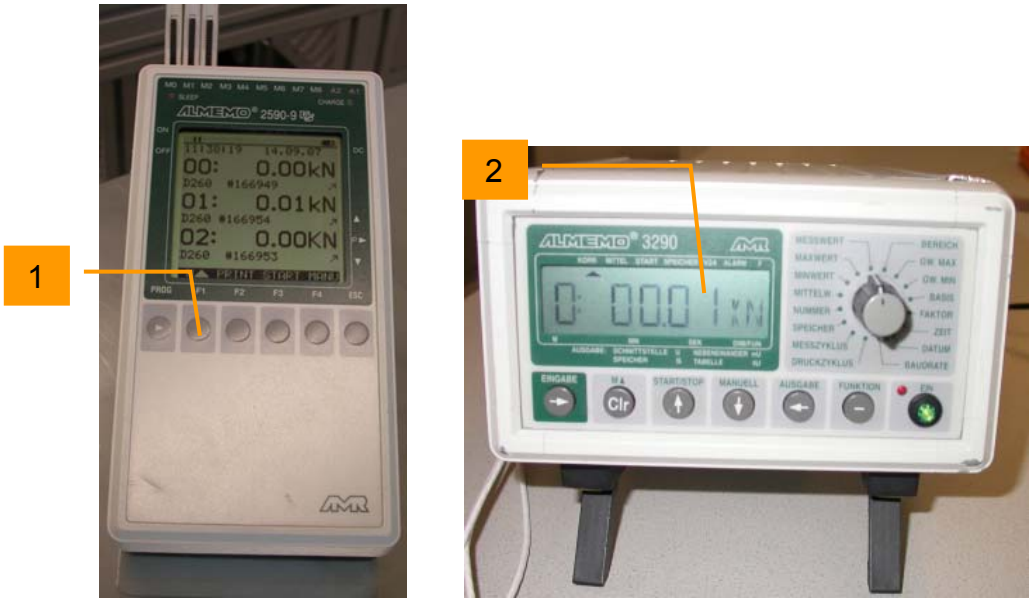

Figure 104

9) Open the “Jobs” –window in the system software. Point with the mouse onto the Chamber –symbol and press left mouse button to open the additional menu for the chamber. Go to “Piston” and press button “Set Piston Force”.

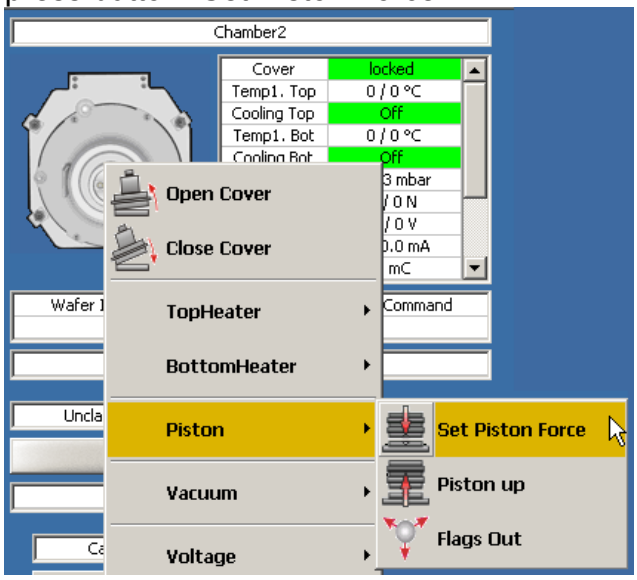

Figure 105 - Load Cell Test - Set Piston Force

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10) Enter the force into field “Setpoint” and press “OK” to confirm.

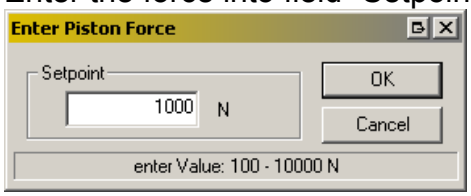


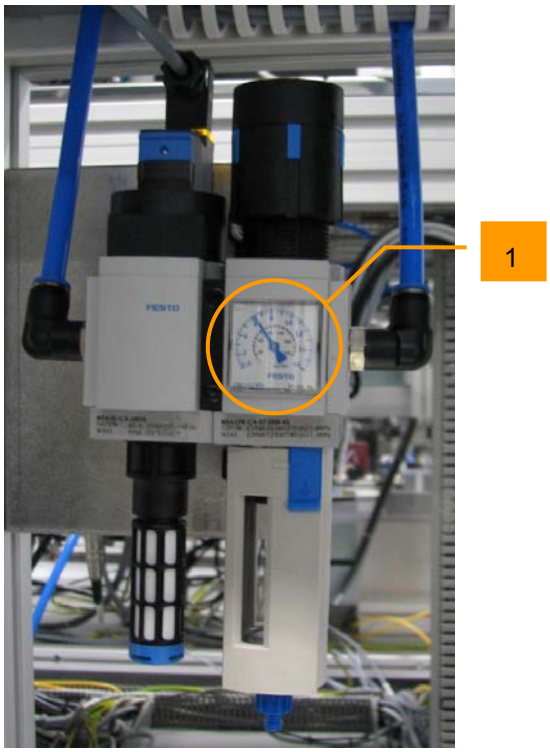
Figure 106 - Load Cell Test - Enter Piston Force

11) Start measurement. Sum up the three values [kN] on the display of the measuring tool and compare with the Setpoint.

12) Remove the measuring gauge and the load cell with caution. Don’t forget to install the glass plate (if equipped) and the screw shown in Figure 100 – Remove screw.

5.6 Main Pressure Regulator Unit

Check the main pressure regulator (1) and the filter for the presence of oil or water.



5.7 Check Voltage, Start/Stop, EMO, Mainswitch

5.7.1 Voltage

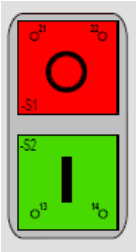
Check that the three phases of the power supply are good, every time turning the main switch on.

Only for EVG501, 510, 520 and 520IS: The three lamps above the main switch stand for the three phases. All of them must be on! If one or more phases are off, the bonder does not work correctly!

Figure 107 - Main Switch - Three Phases (EGV501, EVG520, and EVG520IS)

5.7.2 Check Start/Stop

- Check the function of the Start (“I”) and the Stop (“0”) button:



Note: Shut down the system PC before pressing the Stop button!

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5.7.3 Check EMO Button

Check if the emergency stop is functioning correctly:

Pushing the emergency stop button must bring the system in a safe state position. System must not restart after the button gets unlocked.

Figure 108 - EMO

Note: Shut down the system PC before pressing the EMO button!

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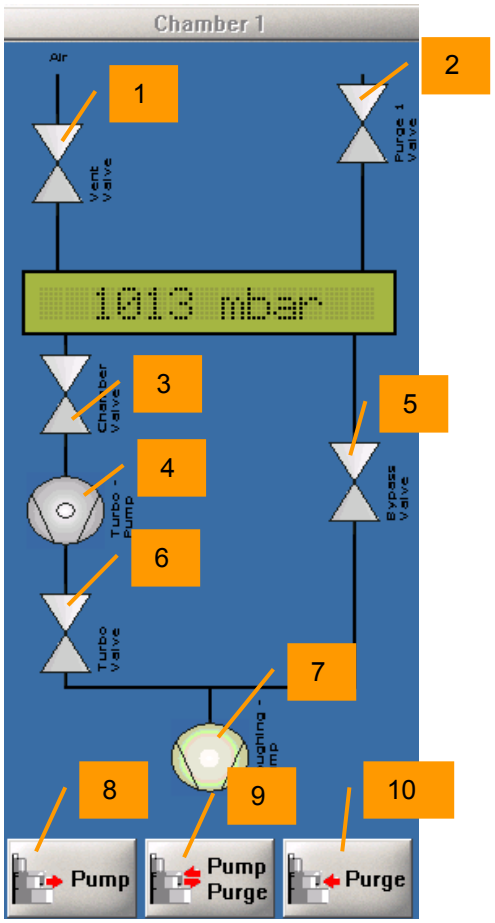
5.8 Vacuum System

Check the functionality of the Vacuum System, depending on the vacuum system configuration. For the vacuum system specifications refer to the Acceptance Test Protocol.



1	Vent Valve
2	Purge 1 Valve
3	Chamber Valve
4	Turbo Pump
5	Bypass Valve
6	Turbo Valve
7	Roughing pump
8	Pump (more details refer to recipe)
9	Pump & Purge (more details refer to recipe)
10	Purge (more details refer to recipe)

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Notice: Vacuum System is customized.

The Vacuum is permanently checked by the software. Error message “MACH: General Vacuum missing!” pops up when the vacuum is missing.

Figure 109 - Error message (Vacuum missing)

5.8.1 Maintenance Evacuate

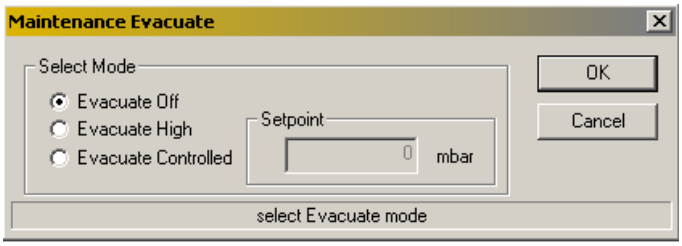

Figure 110 - Maintenance Evacuate

- Evacuate High
- Evacuate Low
- Evacuate Controlled
- Evacuate Off

5.8.2 Maintenance Purge

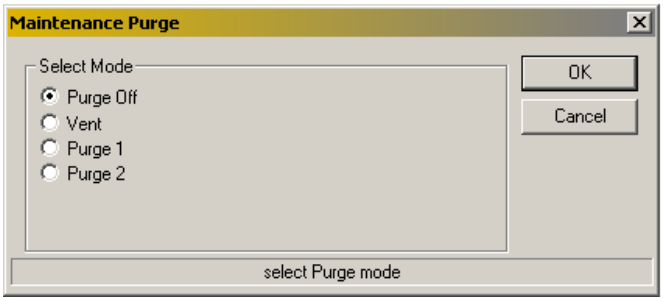

Figure 111 - Maintenance Purge

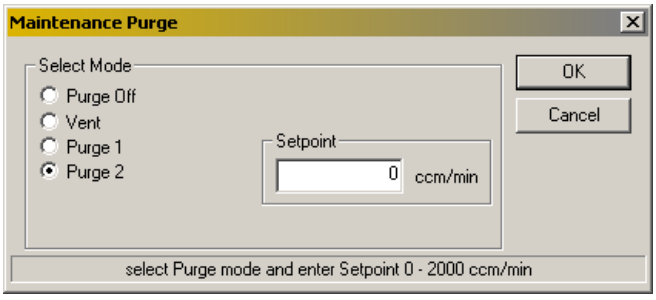

Figure 112 - Maintenance Purge

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- Purge 1
- Purge 2
- Purge 2 with set point in ccm/min
- Purge 3
- Purge Off
- Vent
- Mass Flow Controller

5.8.3 Maintenance Pump and Purge

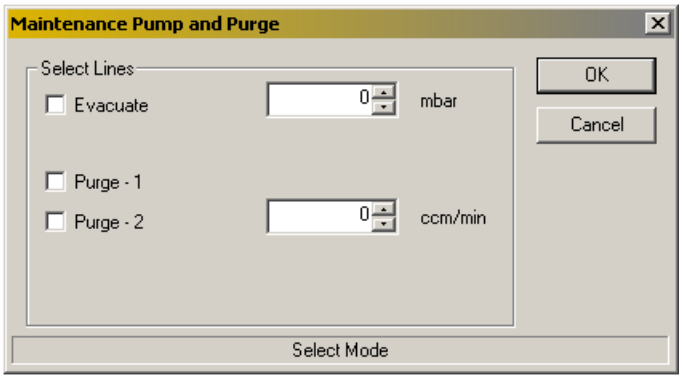

Figure 113 - Maintenance Pump and Purge

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5.9 Safety Valve

To check the function of the safety valve, increase the pressure on the purge gas regulator.

The safety valve must open at:

2bar – 6 and 8inch Bond Chamber

1,3bar – 12inch Bond Chamber

Adjusting the safety valve (only Safety valve SS-RL3M4F4-RT2,1bar SS – 10008714; 6 and 8inch Bond Chamber):

1) Set the pressure on the purge gas regulator to 2,1bar

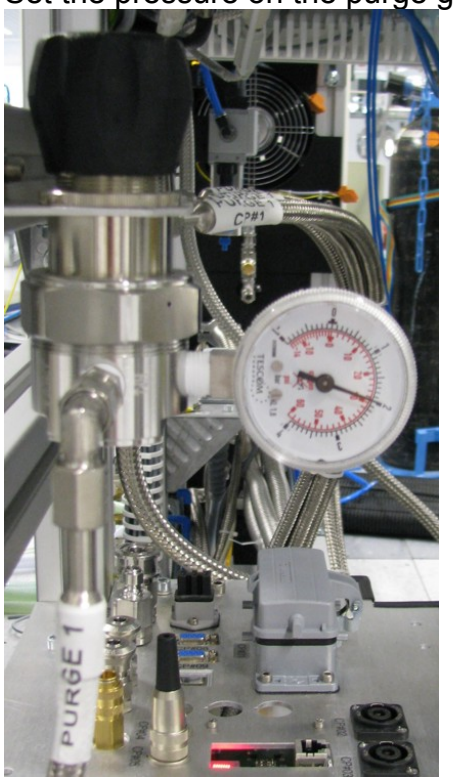

Figure 114

2) Rotate the cap nut until pressure is released from the baffle
3) Rotate the cap nut back until no pressure is released
4) Lock the cap nut

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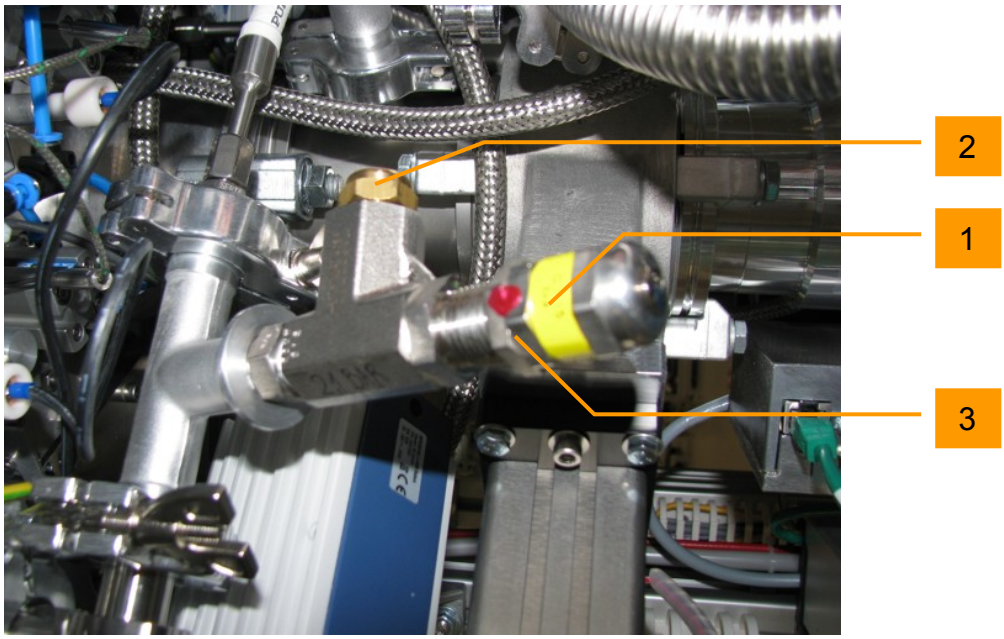

Figure 115

1	Cap nut
2	Baffle
3	Counter nut

5.10 Gauges

The following Gauges are used on the EVG5xx systems (depends on vacuum system configuration).

- Pfeifer HPT100
- Inficon BCG450
- Thyracont VSK42
- MKS Baratron
- ATM23

For troubleshooting refer to the OEM manual or contact EV Group.

Remove the gauges and ship them to EV Group or to the original manufacturer for cleaning and recalibration.

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5.11 Roughing Pump

Following Roughing Pumps are used on the EVG5xx systems (depends on vacuum system configuration).

- Pfeiffer MVP 055-3 - min. Pressure: 2mbar
- Varian SH100 - min. Pressure: 6,6 x 10-2mbar
- Varian SH110 - min. Pressure: 6,6 x 10-2mbar
- BOC Edwards XDS5 - min. Pressure: 7,0 x 10-2mbar
- BOC Edwards XDS10 - min. Pressure: 7,0 x 10-2mbar

The Endvacuum of the Roughing Pump can be checked by connecting an external gauge to the Roughing Pump.

For troubleshooting refer to the OEM manual or contact EV Group.

5.12 Cover Open/Close

Check if all covers open and close smoothly.

5.12.1 Open Cover

Check if the status of “Cover” (1) changes from “closed” to “open” when the cover is opened.

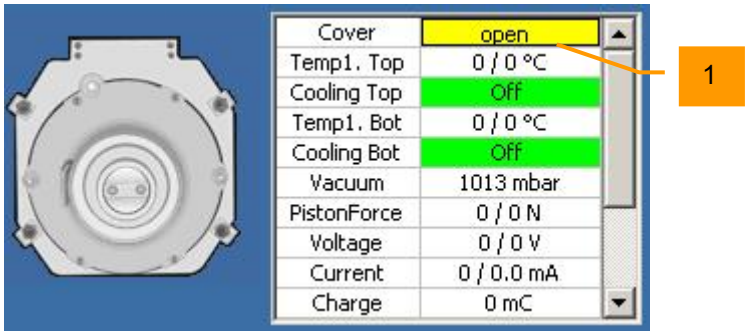

Figure 116 - Status "Cover Open"

5.12.2 Close Cover

Check if the status of “Cover” (1) changes from “open” to “closed” when the cover is closed.

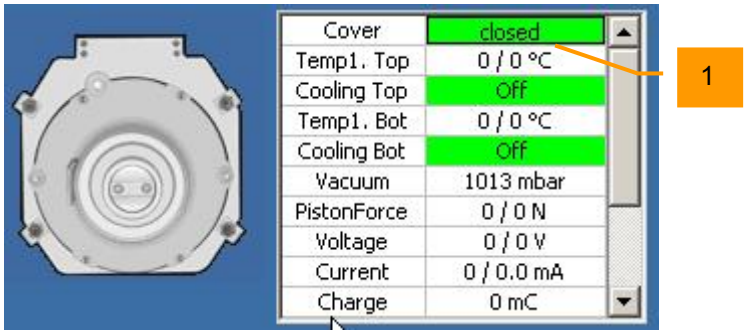

Figure 117 - Status "Cover Closed"

5.13 Check of Sensors

5.13.1 Leakage Sensor

Put a paper strip underneath the leakage sensor to check the functionality. The sensor must release → LED on the sensor will be off, error message “MACH: Leakage detected” will appear in the SW and the water flow will be stopped.

If the sensor doesn’t release adjust the sensitivity with the potentiometer.

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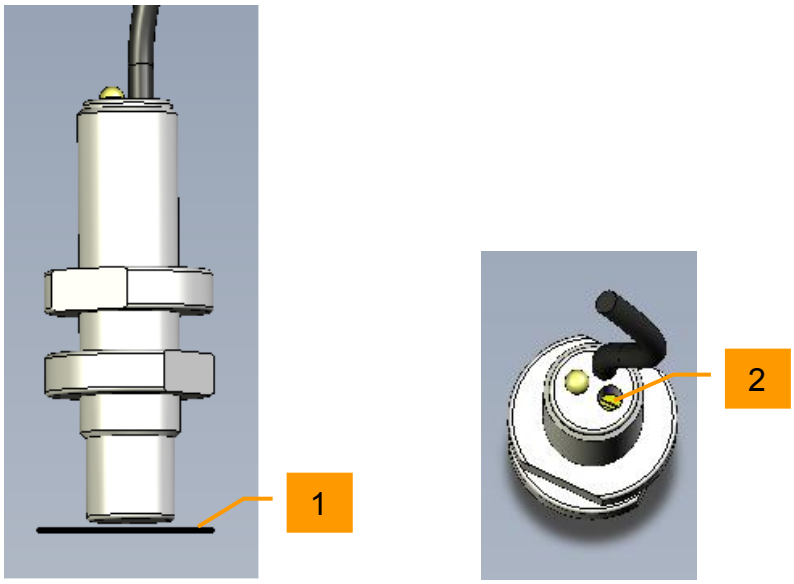

Figure 118 - Leakage Sensors

1	Paper Strip
2	Potentiometer

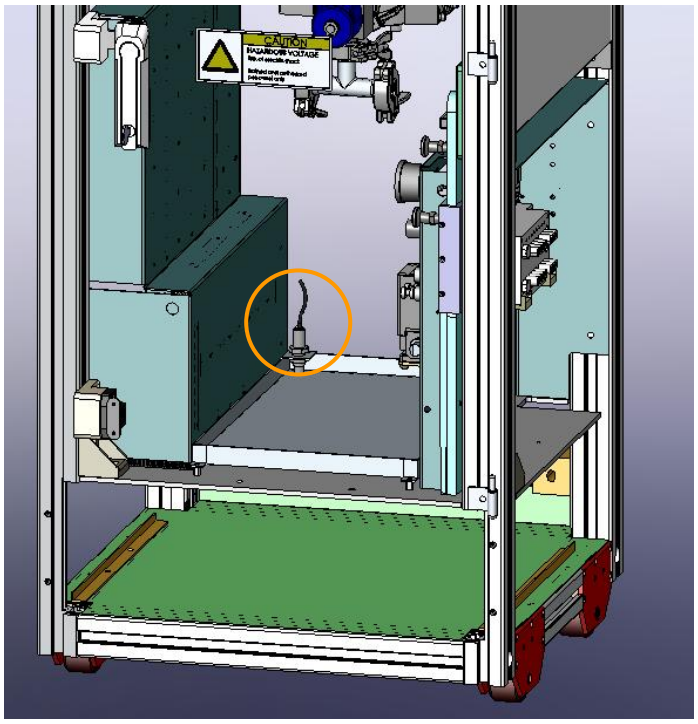

Figure 119 - Position of Leakage Sensor

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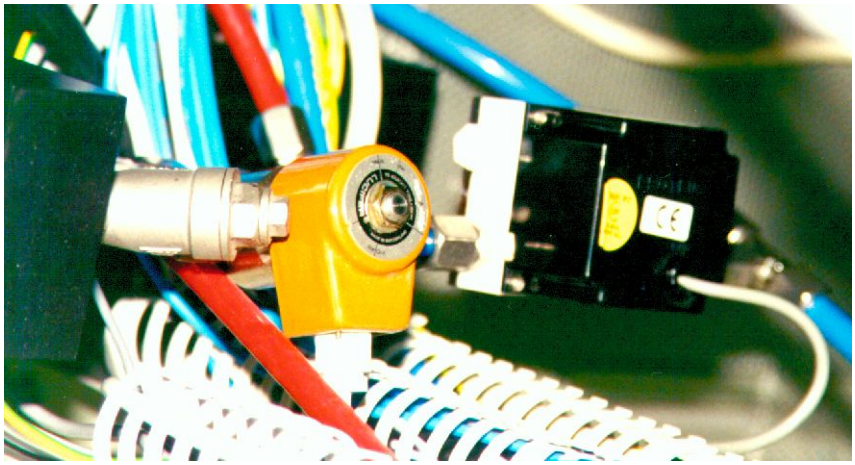
5.14 Water filter

Open the water filter and clean it. If there are any deposits in the sieve check your cooling water quality. To find the location of the water filter refer to the picture below.



5.15 Water Cooling/Glycol Mix

5.15.1 Cooling Water Quality:

Closed loop system filtered (100 micron filters); the cooling water must be mechanically clean, optically clear, without deposits, to keep the cooling circuit free from dirt and organic suspended matter. To avoid corrosion damages, the following requirements for the cooling water must be met:

5.15.2 Requirements:

Recommended is the mixing of inhibited Propylenglycol 30 - 50 % Vol. in DI-Water (e.g.: Heat Transfer Fluid Dowcal 20 from DOW Chemical Company)

pH value: 7 – 8.2

max. oxygen content: < 4mg/kg (ppm) - due to level of Propylenglycol

5.16 Water Flow

The cooling water flow is also permanently checked by the software. If the water is turned off, there must be an error message after some time.

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5.16.1 Adjust Water Flow

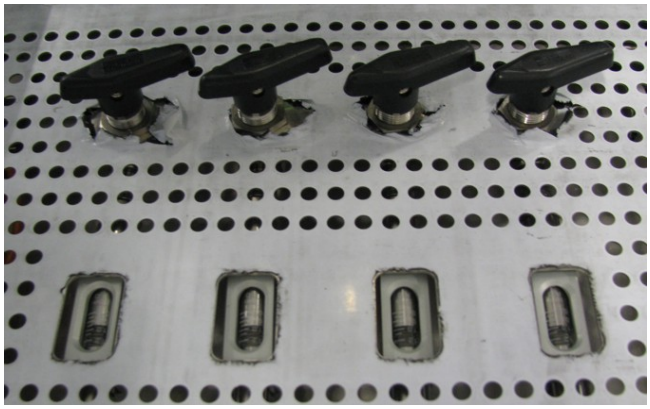

Figure 120 - Flow Meter

1) Close and open each flow meter to make sure that it does not stick and that the cooling line is not clogged.
2) Set the flow rates according to the table below (or according to specifications from the system installation):

System	Diameter (in mm)	Passive cooling	Active top-side cooling	Active bottom-side cooling
EVG501	150 / 200	**1l/min**	N/A	N/A
EVG510	150 / 200	**1l/min**	N/A	**1l/min**
All others	150 / 200	**1l/min**	**1l/min**	**1l/min**
All others	300	**1l/min**	**2l/min**	**2l/min**

External cooling station (150, 200 and 300mm): **1l/min**.

Notice: Do not adjust the flow rate to a different value! An inappropriate flow rate may cause substantial damage to certain components of the system!

5.16.2 Chiller

The following Chillers are used on the EVG5xx systems.

- Neslab System II Liquid to Liquid Heat Exchanger
- Neslab Merlin M75D
- Thermoflex 2500

Check the temperature setting of the chiller. The recommended temperature is 18°-20°C.

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5.17 Cooling Chucks

5.17.1 Bottom Side Cooling Chuck

Turn the Bottom Cooling On/Off and check the status in the SW.

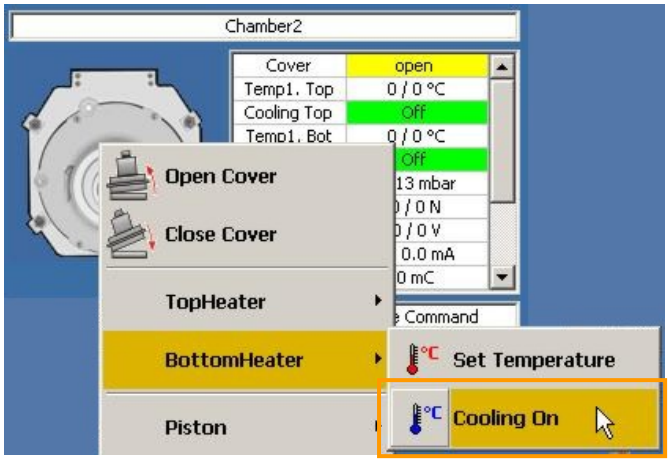

Figure 121 - Cooling On / Off

Check the movement of the Cooling chuck.

Adjust sensors for Cool Chuck On/Off if necessary.

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5.17.1.1 Adjust Endswitches – Bottom Cooling

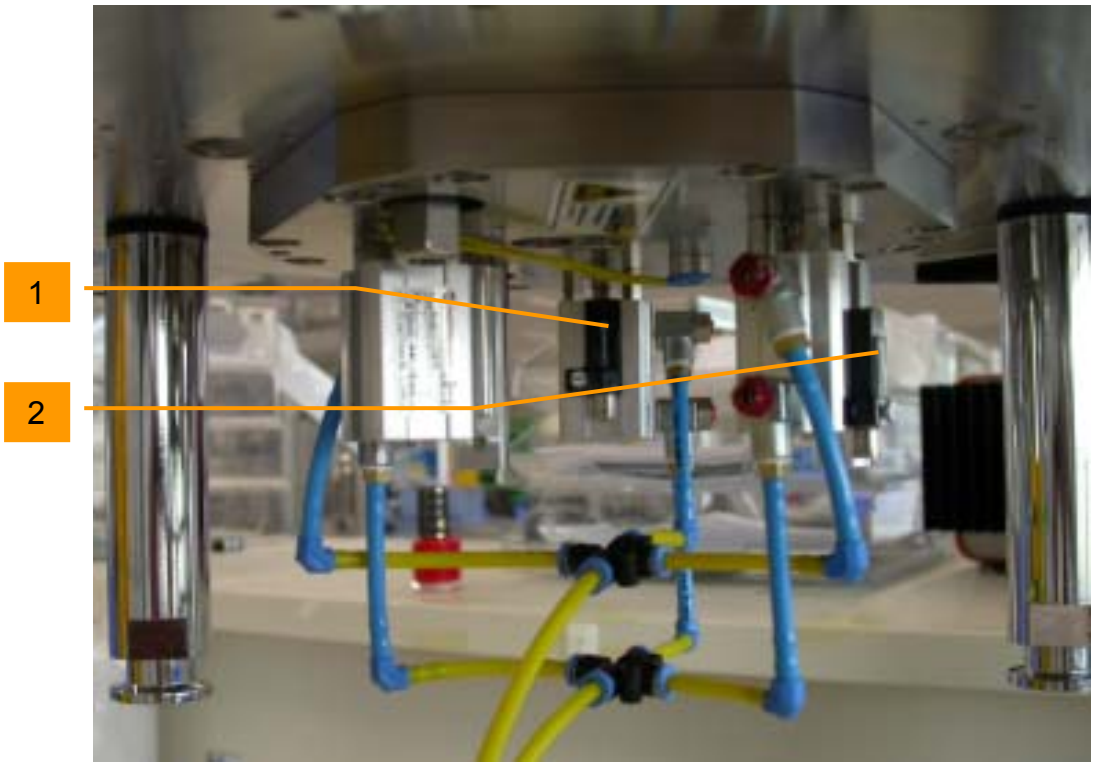

Figure 122 - Endswitches for "Cooling Bottom ON/OFF"

1	Cooling Bottom ON
2	Cooling Bottom OFF

If it is not possible to reach the two end switches (Figure 123 – Endswitches for “Cooling Bottom ON/OFF”; 1 and 2) for any adjustments, it is necessary to dismount the bond module (loosen the two fastening screws).

Caution: Do not peg out the connectors. The functions of the end switches will only work with all connections and on-state!

Readjust the end switch for “Cooling Bottom Off” (this is the end switch in the lower position). For this loosen the fastening screw and turn the cooling to “Cooling Off”. Toggle the end switch as long as you can see the LED on and off. Find the position where the LED in upper position is just about ON.

Turn the cooling to “Cooling ON” for testing. The LED at the new adjusted end switch must be OFF now.

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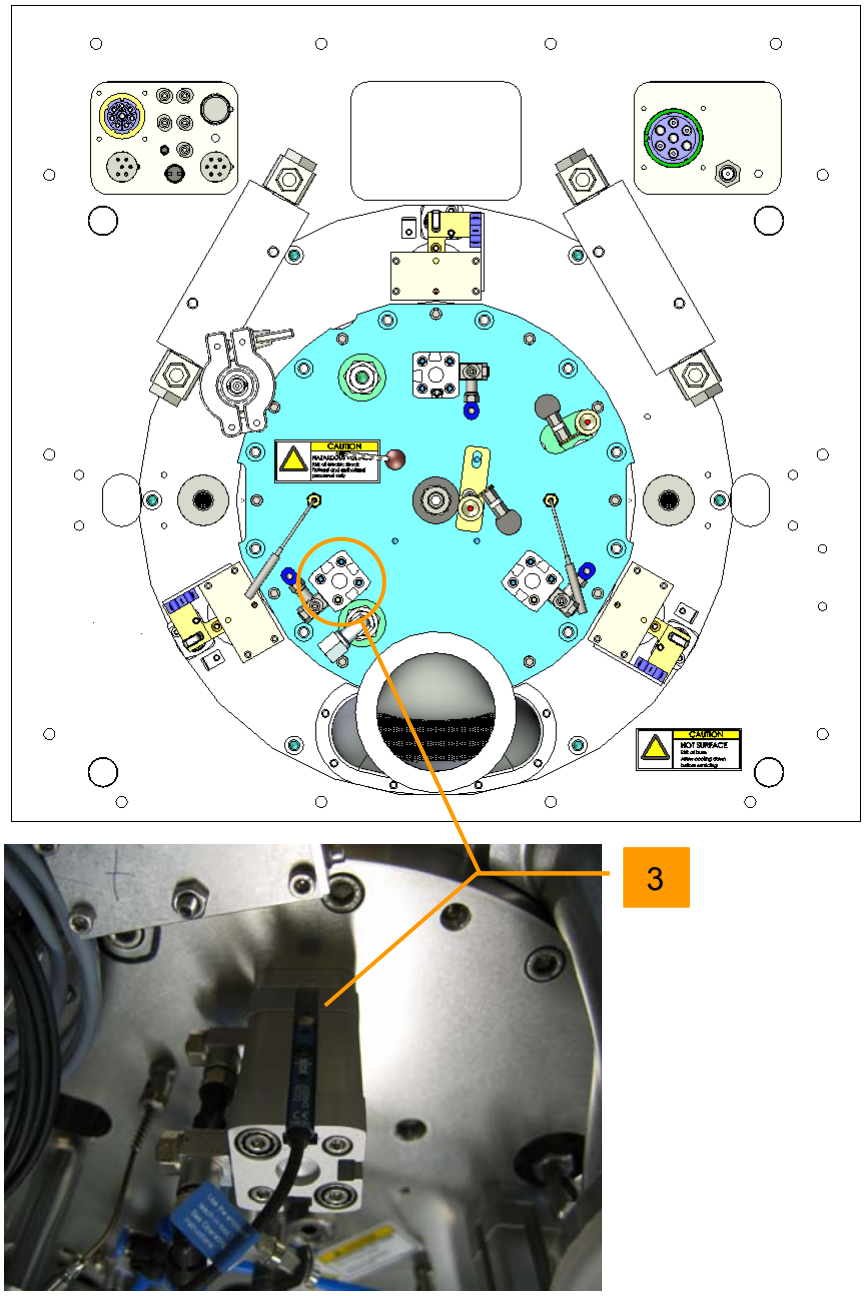
On the newer systems only one end switch (3) is used for ON/OFF.



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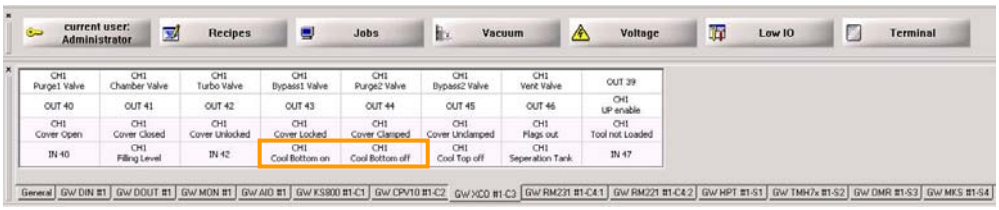
To adjust the end switch press the button (4) and turn the cooling on and off.

Check the inputs in the Low IO, Chamber x „GW XCO #1-C3“:



5.17.2 Top Side Cooling Chuck

1) Optical Check of the System

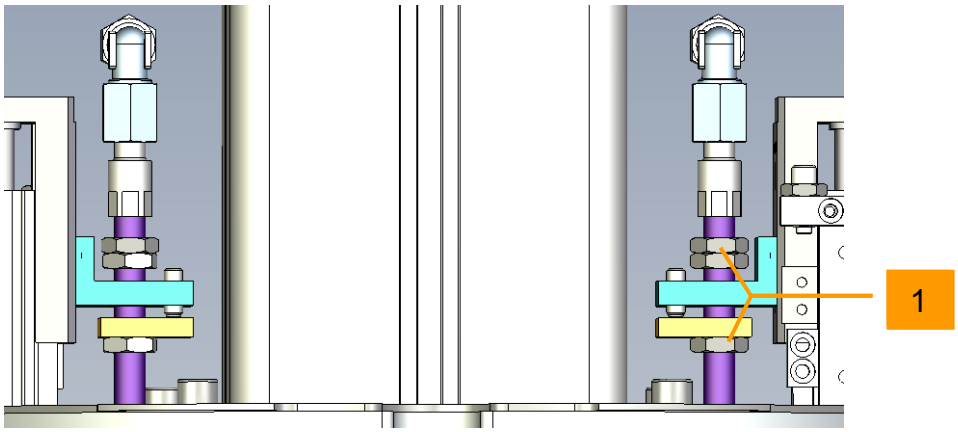
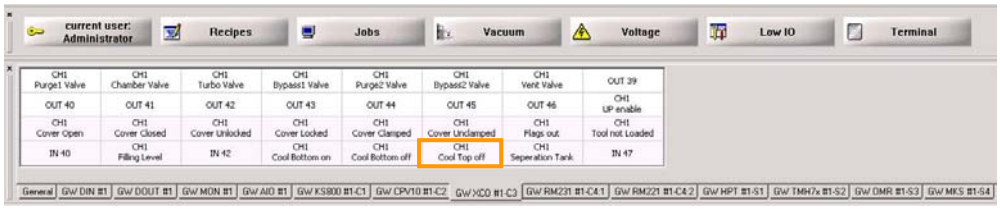


Figure 123

2) Check if locking nuts (1) are tightened as shown in previous drawing.

3) Check if the movement of cool chuck up and down is smoothly and parallel.

4) Apply cooling ON/OFF in the SW and check “Cool Top off” input in Low IO Chamber x “GW XCO #1-C3.



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5.17.3 Cooling Time

Check the Cooling Time of the system.

1) Load bond chuck with wafer into chamber
2) Close chamber
3) Evacuate till 5mbar
4) Fill chamber with N2
5) Piston Down with low force (appr.1000N)
6) Heat chamber till 400°C with both heaters if the max. temperature of the system is 550°C. If the temperature of the system is limited <400°C use the max. temperature limit for this test, i.e.: 200°C, 250°C.
7) Wait 5min
8) Activate top (if equipped) - and bottom side cooling
9) Test ends when temperature reaches 100°C on both heaters according to chamber TCs.

Note: For the Cooling Time refer to the Cooling Performance Specification according to the Acceptance Test Protocol.

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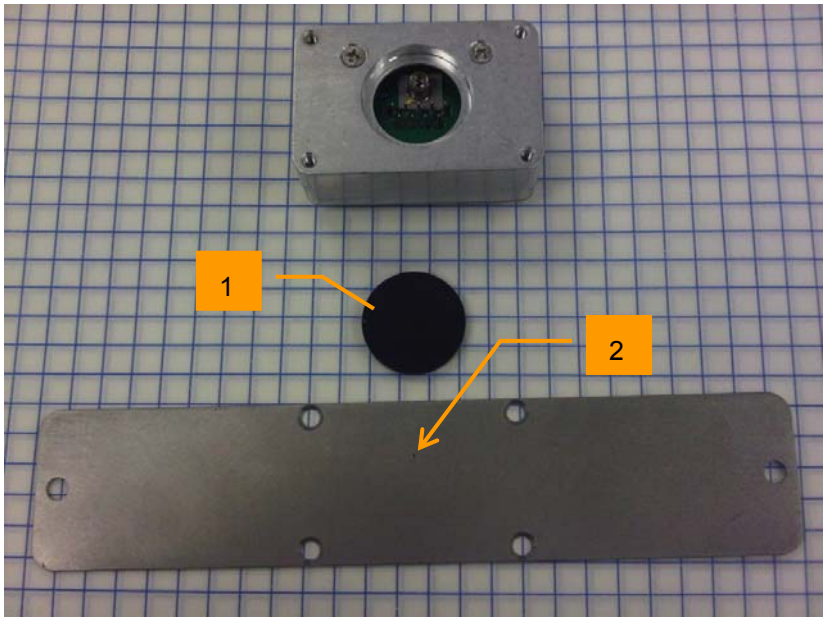
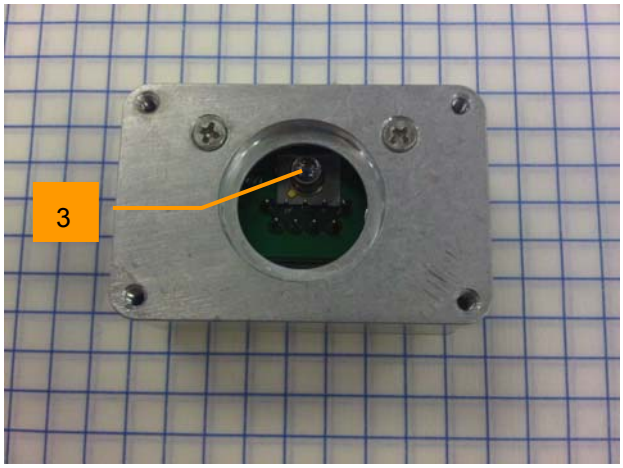
5.18 UV-Light Integrator Adjustment

5.18.1 Check Assembling of UV Sensor

1) Disassemble Sensor:





1	Filter
2	Hole in the plate
3	Photodiode

Attention: The Photodiode must be exactly at the position of the hole in the plate.

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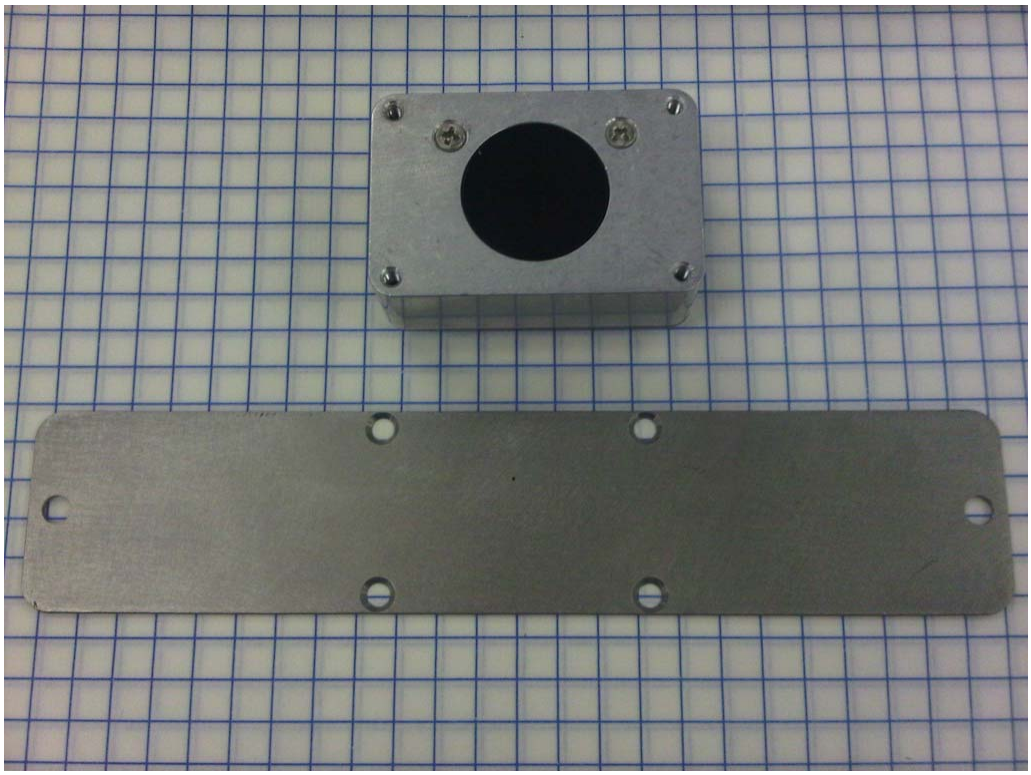
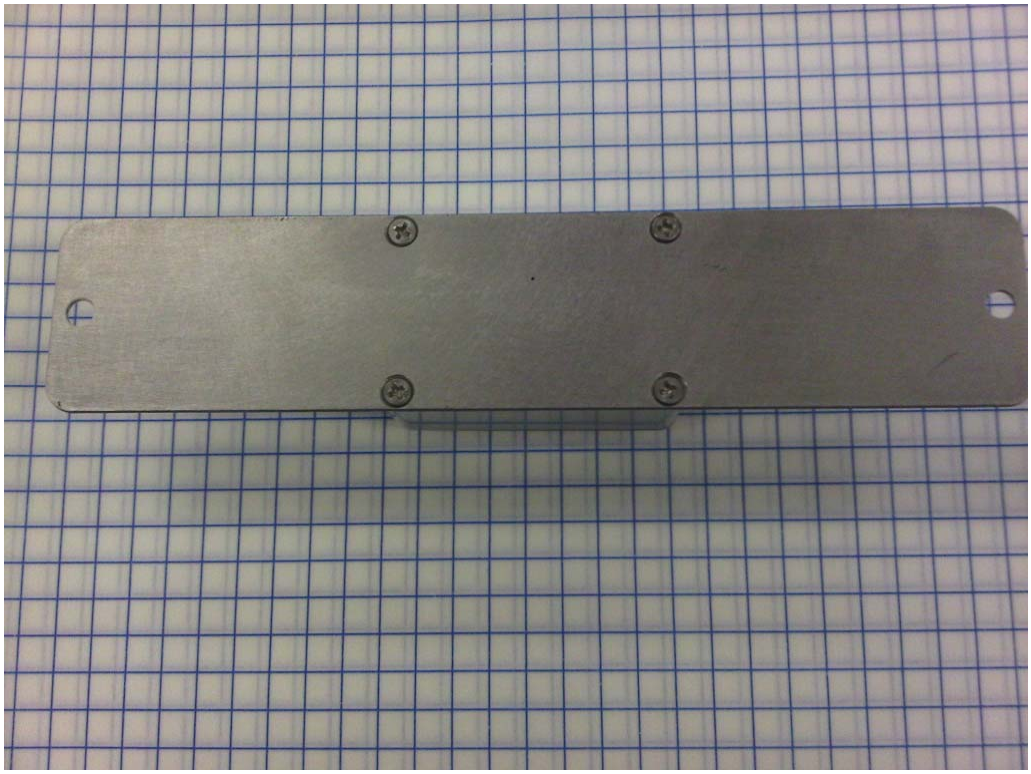
2) Put the filter into the device. It does not matter which side up.



3) Mount the plate with the hole at the position of the photodiode.



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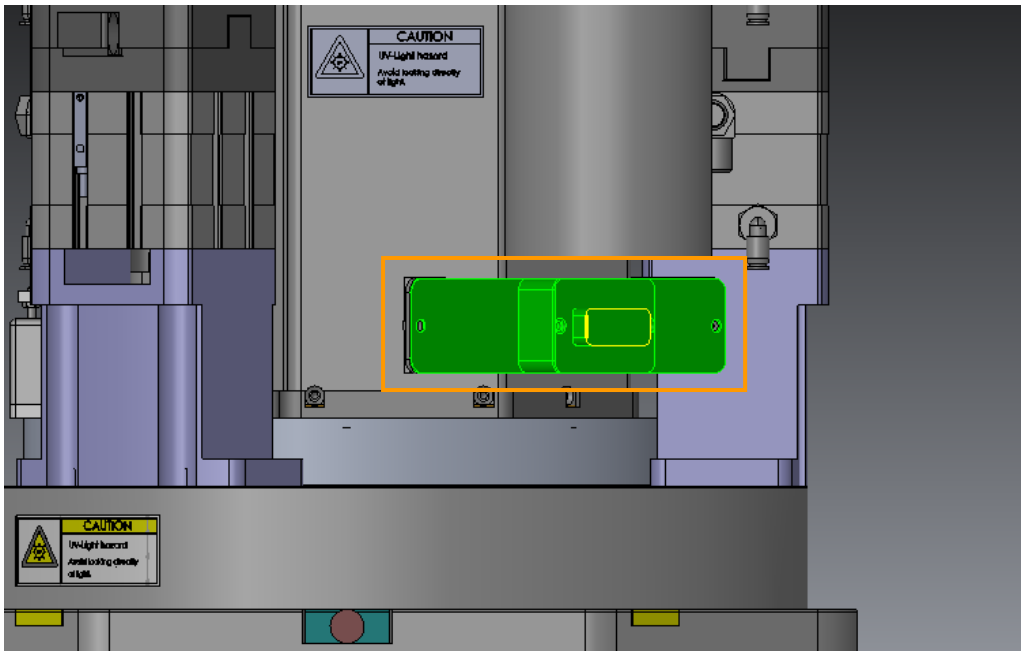
5.18.2 Mount Sensor to the Light House

1) Mount the Sensor to the Light House like shown below:



Note: Make sure the hole of the plate fits exactly to the hole of the lamp house.

2) Connect the cable (Sub-D-9 pins) to the sensor.

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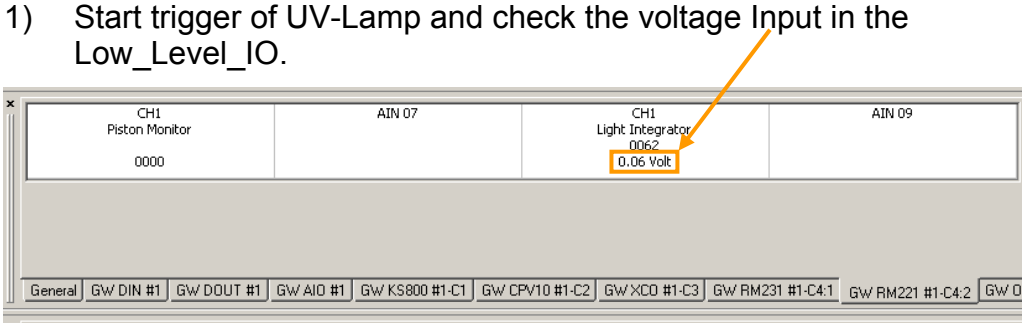
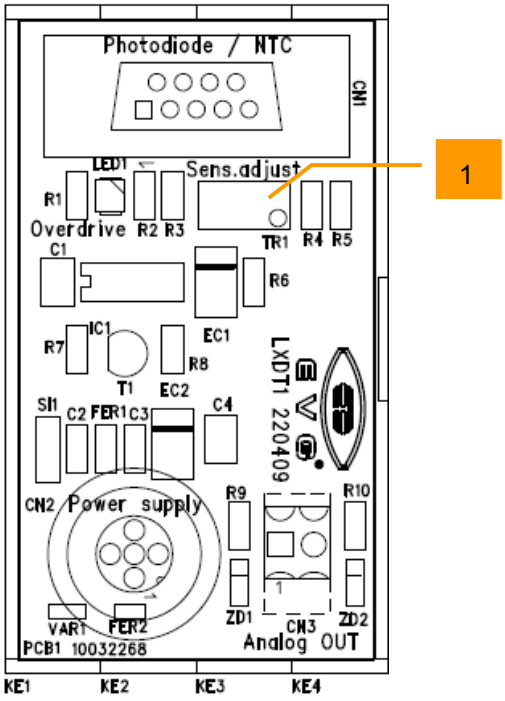
5.18.3 Voltage Input Adjustment

Note: For the adjustment please make sure that a new lamp will be used (installed).

1) Start trigger of UV-Lamp and check the voltage Input in the Low_Level_IO.



2) Find the board at the connection area bond module which is located on the left hand side of the bond module. Use a small slotted screwdriver to decrease or increase the voltage to ~4,25V.

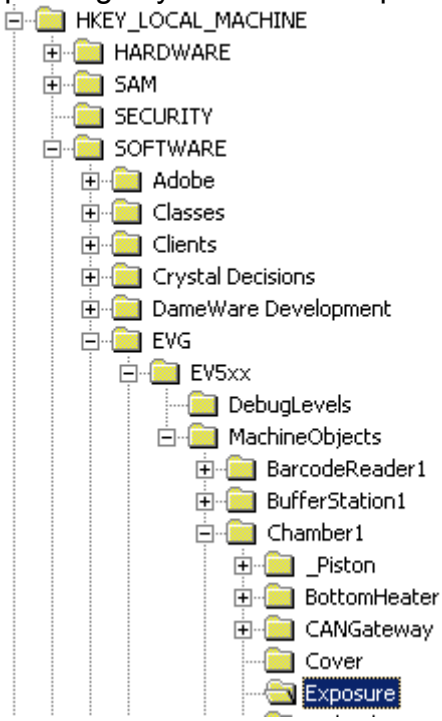


1	Adjust the input voltage with this potentiometer

5.18.4 Monitor Signal Adjustment

1) Use external measurement tool to measure the real intensity of the new lamp. (For example 90 mW/cm2).

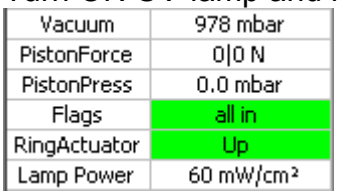
2) Open registry folder ……\Exposure



3) Check current Light integrator factor:

(In this case 0.04)

4) Turn ON UV-lamp and read current Lamp Power (e.g. 60mW/cm²)



Vacuum	978 mbar
PistonForce	0|0 N
PistonPress	0.0 mbar
Flags	all in
RingActuator	Up
Lamp Power	60 mW/cm²

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5) Calculate new value for “LightIntegratorFactor” by using the following formula:

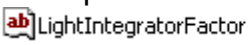
$$\text{LightIntegratorFactor} = \frac{\text{Current Factor}}{\text{Current Lamp Power}} \text{ x Real Lamp Power}$$

Example (using values from above):

$$\frac{0.04}{60\text{mW/cm}^2} * 90\text{mW/cm}^2 = 0.06$$

6) Change the registry parameter to the calculated value and restart IO_Serivce to activate the changes.

Example:



7) After restarting the IO_Serivce the monitor signal should show the real value. (~90mW/cm2).

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5.19 Over Temperature Switch

Check the function of the over temperature sensors.

5.19.1 Top Side

Top side (Remove the shield to get access to the switch)

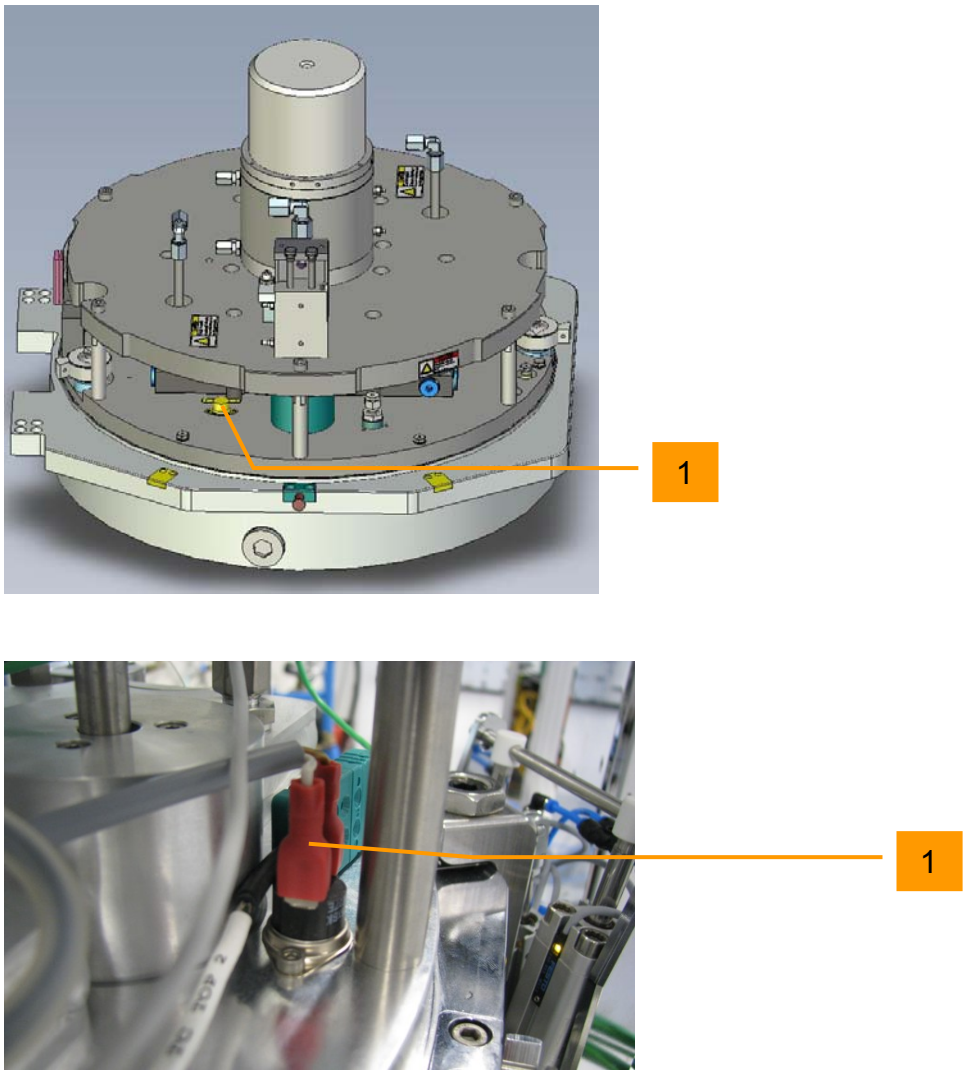

Figure 124 - Over Temperature Switch Top Side

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5.19.2 Bottom side

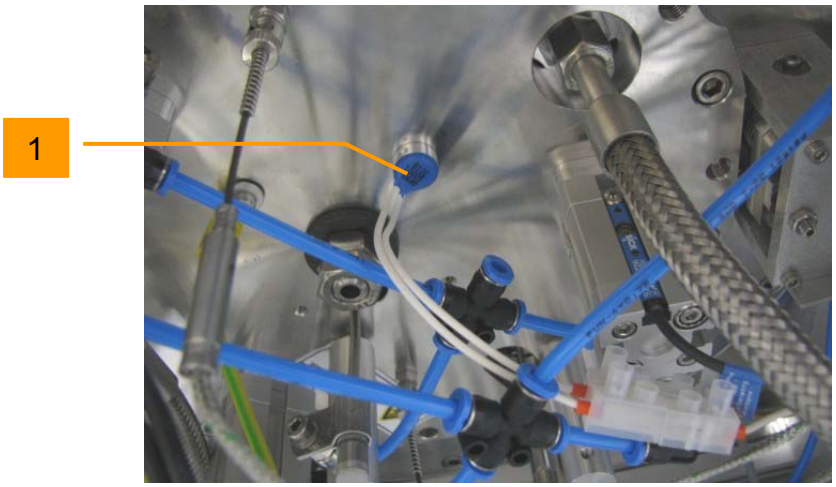
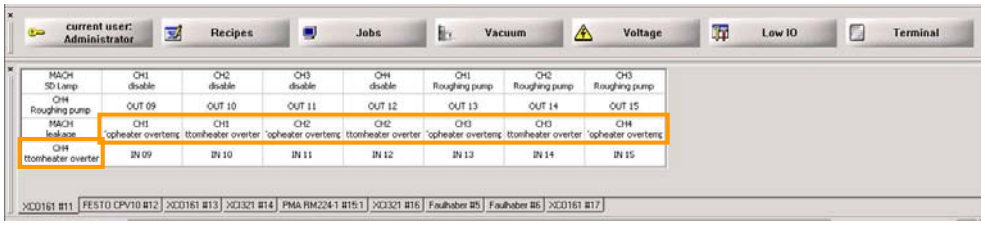


Figure 125 - Over Temperature Switch Bottom Side

Disconnecting the over temperature sensor must disable the chamber → check SW input Low IO General “XCO161 #11”

Remove over temperature sensor and heat it with a hot air gun. Over temperature sensor must shut off → check SW input Low IO General “XCO161 #11”



Top side at 63°C

Bottom side at 125°C

6 Quarterly Maintenance

6.1 Checking Bond module and chuck

Make a visual check of the Bond tool and the chuck. There should be no crack or spot detectable. The surface must be flat.

6.2 Chuck Polish Check

6.2.1 Polish Bond Chuck Insert (Backside)

Use EVG polishing tool (Arkansas stone) for maintenance procedure:

Figure 126 - EVG Polish Tool

1) Clean the backside of the bond chuck insert with IPA.
2) Clean polishing tool with IPA.
3) Polish the surface with the tool by sliding the stone in a circular movement (see below).

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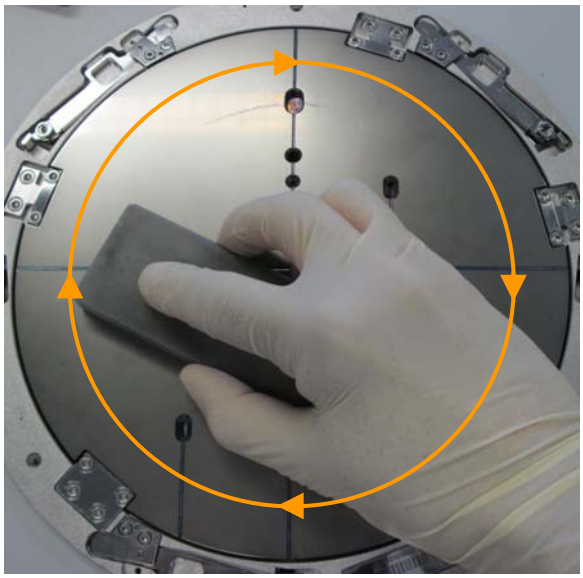

Figure 127 - EVG Polish Procedure

4) After 20 circles clean up chuck insert and stone again with IPA.

Repeat the steps above 10 times.

6.2.2 Thermo Chuck

Use EVG tool (Arkansas) to polish:

Figure 128 - EVG Polish Tool

1) Clean the surface of the thermo chuck with IPA.
2) Clean the polishing tool with IPA.
3) Polish the surface with the tool by sliding the stone in a circular movement (see below).

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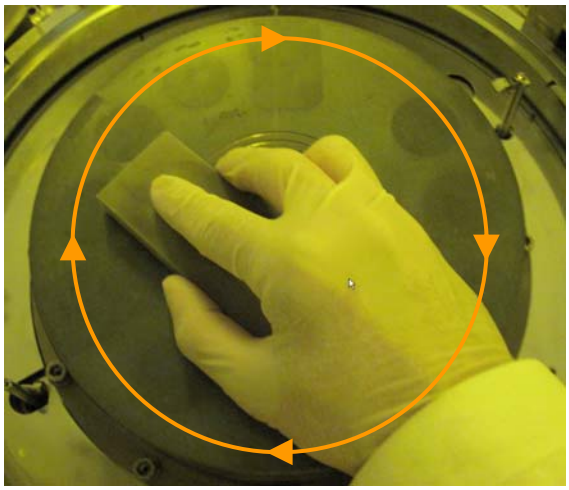

Figure 129 - EVG Polish Procedure

4) After 20 circles clean up chuck insert and stone again with IPA.

Repeat the steps above 10 times.

6.2.3 Maintenance Frequency

6.2.3.1 Bond Chuck

The bond chuck maintenance has to be done once every 50 bonds:

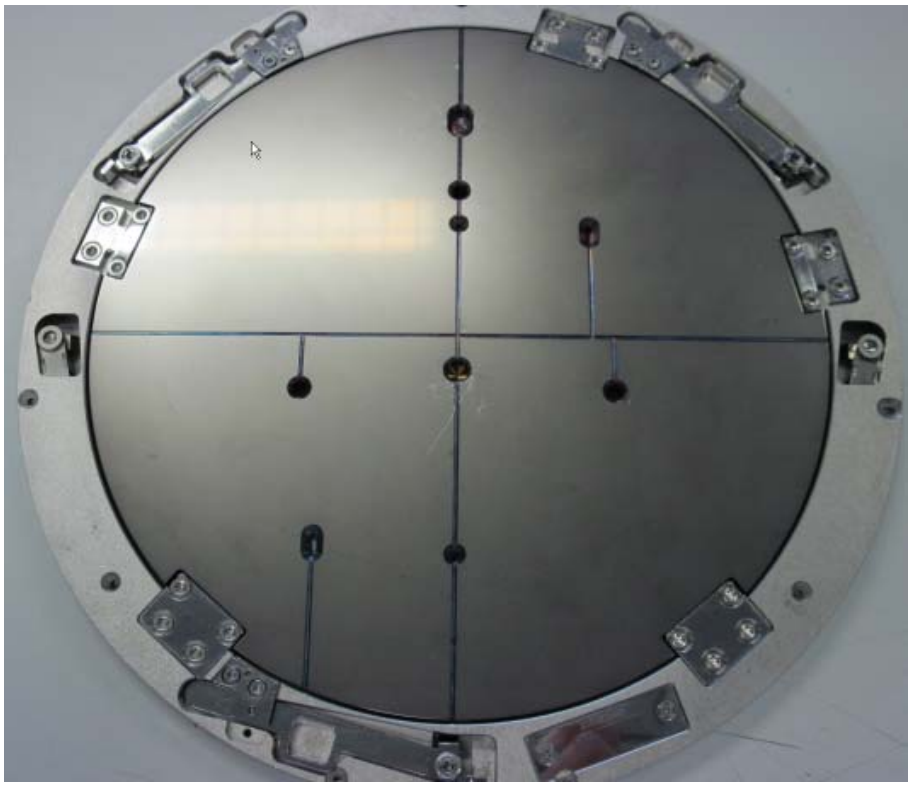

Figure 130 - Bond Chuck

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6.2.3.2 Thermo Chuck

The thermo chuck maintenance has to be done weekly.

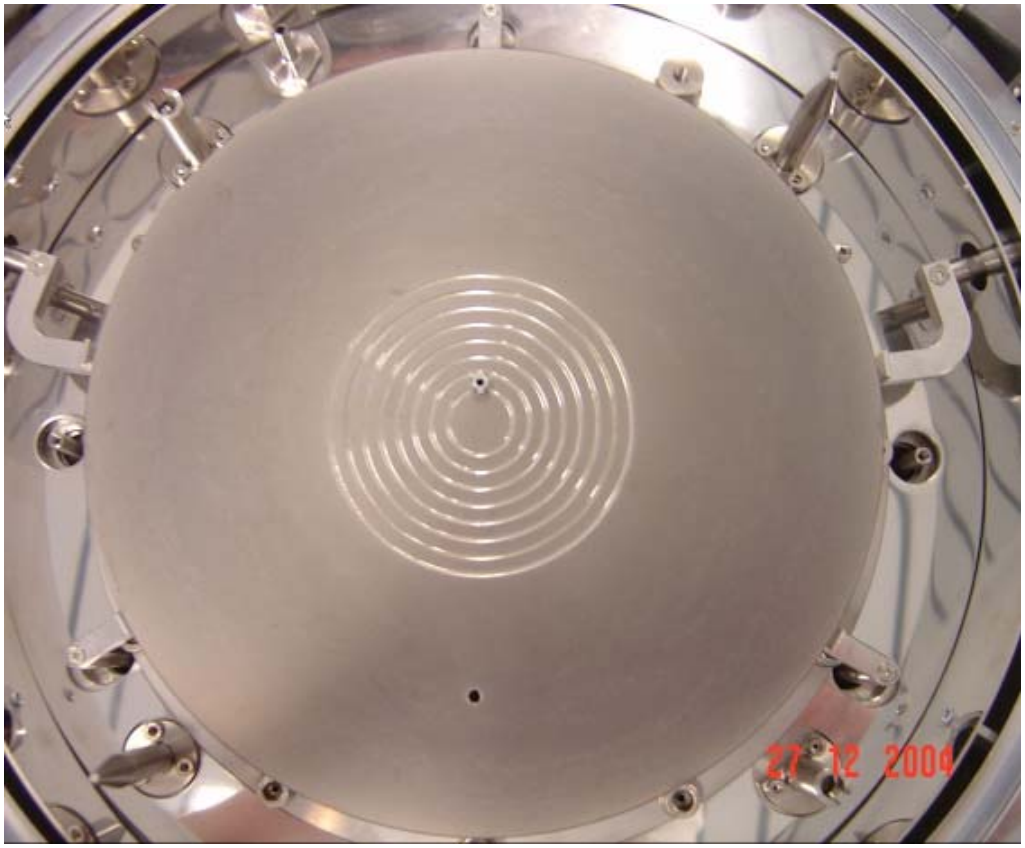

Figure 131 - Thermo Chuck

6.3 Adjust heater offset

6.3.1 Short Description

6.3.1.1 Temperature offset:

The thermocouple sensors used on EVG bonding systems are very accurate, but still have a small measurement tolerance. That is why the same temperature reading on different EVG bonding machines may lead to a small temperature difference from bonder to bonder.

In order to compensate this difference and to run one production bonding recipe on different machine with the same result, a temperature offset setting is possible which can be adjusted individually from bondchamber to bondchamber.

This setting adds an individually adjustable offset in the range of +5 to -5°C to the set point in the recipe. The status window on the screen shows the temperature including the offset.

e.g.: If a 380°C heating set point is adjusted in the recipe and the offset is defined with +3°C, the heaters reach a temperature of 383°C according to the thermocouple in the bonder and will show 383°C in the status window and in the recorder file.

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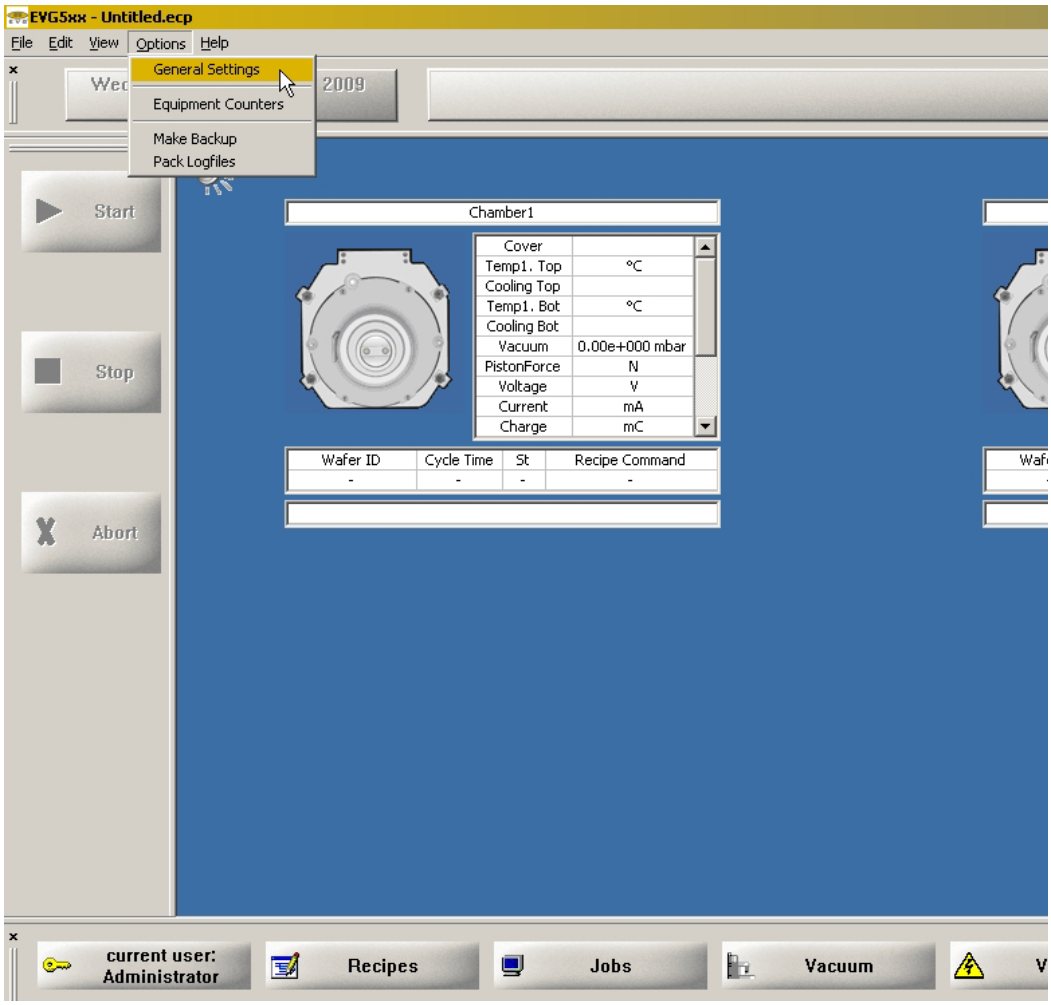
6.3.2 How to adjust the temperature offset

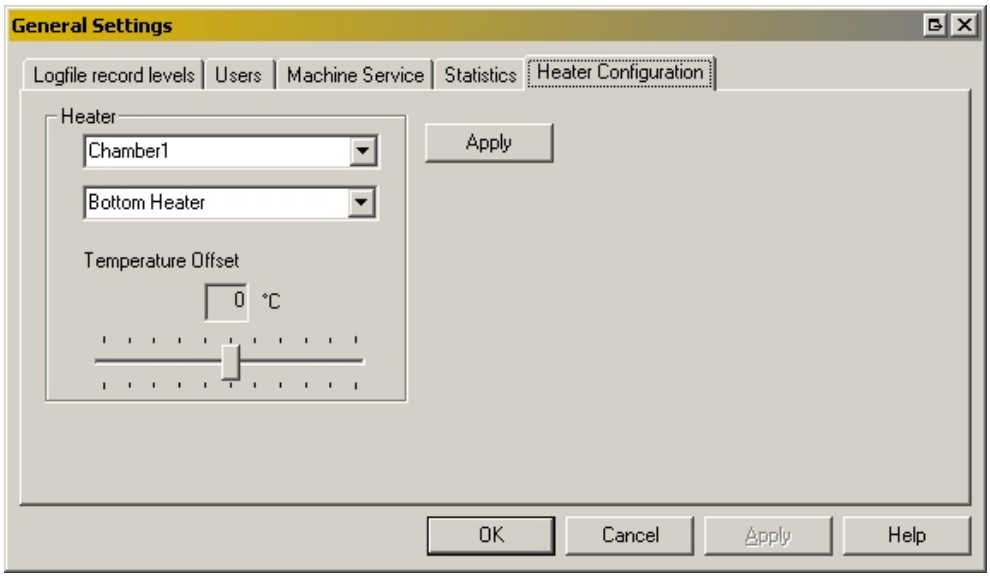
To adjust the heater offset click on:

Options\General Settings\Heater Configuration

(as shown in the window below):



Here a temperature offset of +/- 5° C for every heater can be set.



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Afterwards the apply button has to be clicked for saving the new adjustment. This will not work if a process is running. In this case there will be a message that the IO service has to be restarted to apply the adjustment.

These adjustments can only be done by administrators.

6.4 TC Wafer Test

1) Clean bond chuck, pressure disc and TC wafer with IPA
2) Remove the wafer bow pin (if equipped)
3) Load a bond chuck with TC wafer into the chamber
4) Connect TC Wafer with data logger.
5) Close chamber
6) Piston Down with low force (1000N)
7) Heat chamber to 100°C, 200°C, 300°C, 400°C, 500°C with both heaters. Wait 180sec until the setpoint is reached and calculate the temperature uniformity with the formula: (max-min) / (2 x average)

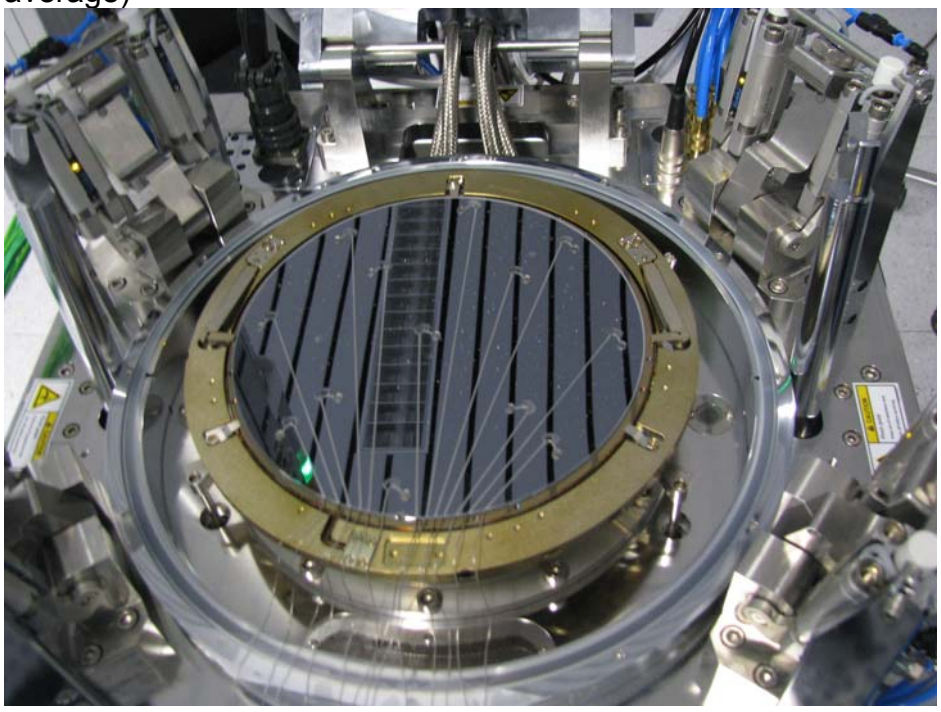

Figure 132 - TC Wafer Test

Note: For the temperature uniformity specification refer to the Acceptance Test Protocol.

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7 Annual Inspection

Check the following points in addition to the monthly maintenance

Tools needed for any PM.

Metric Allen wrench set

US Allen wrench set

Metric open-end box end wrenches

Philips head screwdriver (small and medium size)

Flat head screwdriver (small and medium size)

Volt meter

Spare Latex gloves

7.1 Cooling Fluid

Use a hydrometer to check if the fluid contains the proper percentage of Glycol.

Ensure that the flow and pressure meets the specifications. Also check the PH value of the fluid.

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7.2 Cooling Lines

Check the cooling lines for any damage or leakage:

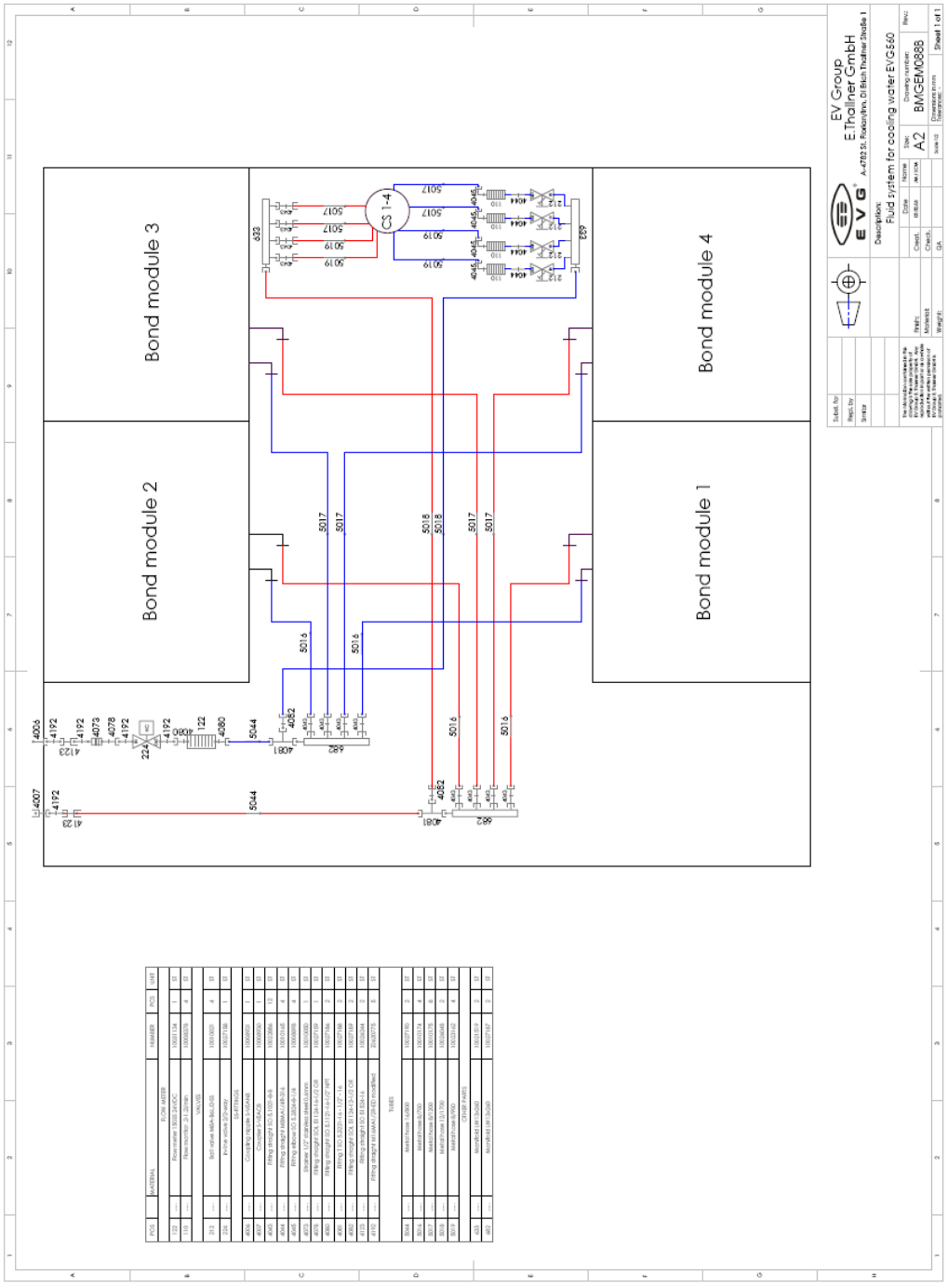
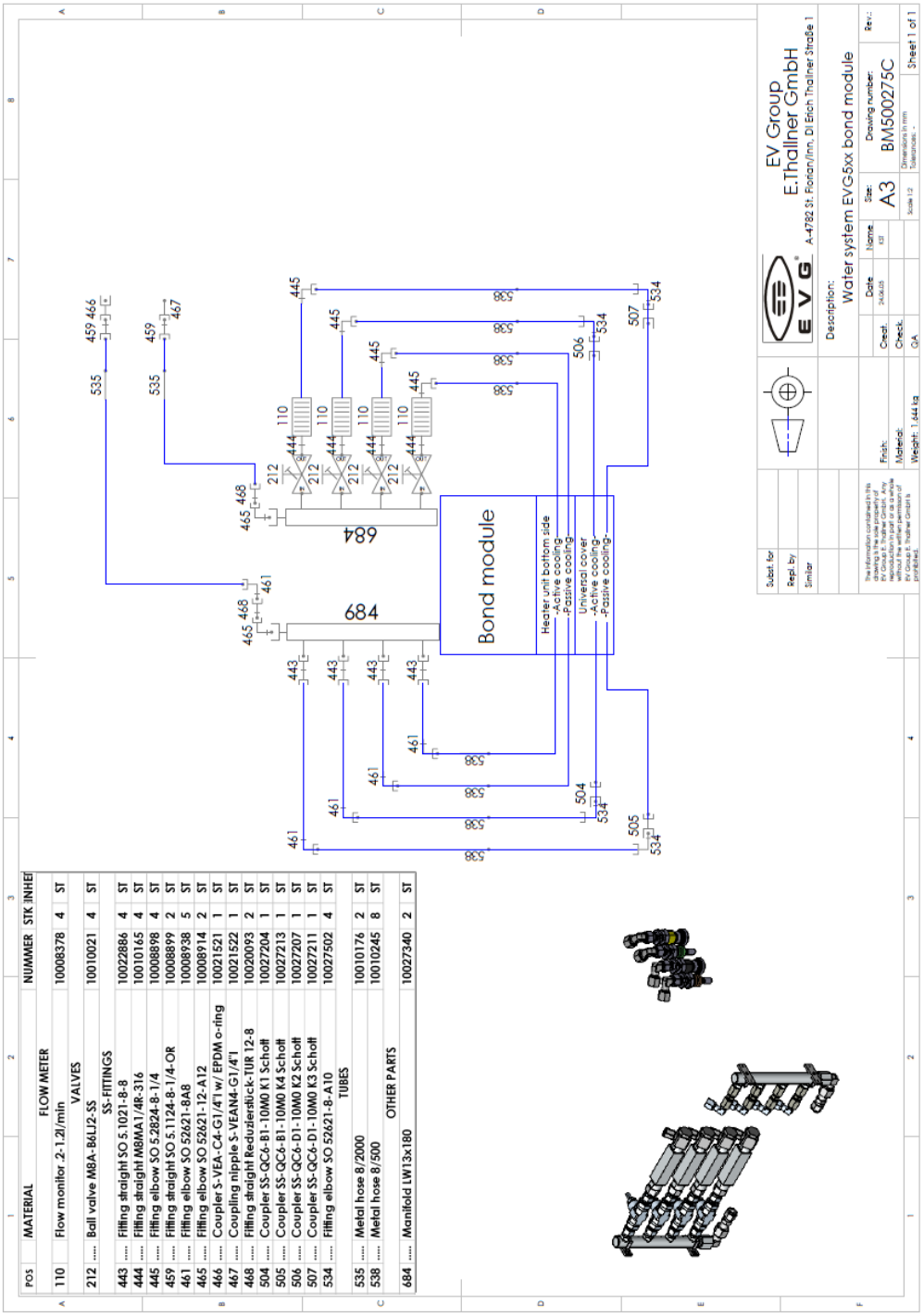


Figure 133 - Water System



POS	MATERIAL	NUMMER	STK	INHEIT
	FLOW METER			
110	Flow monitor 2-1.2l/min	10008378	4	ST
	VALVES			
212	.... Ball valve M8A-B6LI2-SS	10010021	4	ST
	SS-FITTINGS			
443	.... Fitting straight SO 5.1021-8-8	10022886	4	ST
444	.... Fitting straight M8MA1/4R-316	10010165	4	ST
445	.... Fitting elbow SO 5.2824-8-1/4	10008898	4	ST
459	.... Fitting straight SO 5.1124-8-1/4-OR	10008899	2	ST
461	.... Fitting elbow SO 52621-8A8	10008938	5	ST
465	.... Fitting elbow SO 52621-12-A12	10008914	2	ST
466	.... Coupler S-VEA-C4-G1/4"I w/ EPDM o-ring	10021521	1	ST
467	.... Coupling nipple S-VEAN4-G1/4"I	10021522	1	ST
468	.... Fitting straight Reduzierstück-TUR 12-8	10020093	2	ST
504	.... Coupler SS-QC6-B1-10M0 K1 Schott	10027204	1	ST
505	.... Coupler SS-QC6-B1-10M0 K4 Schott	10027213	1	ST
506	.... Coupler SS-QC6-D1-10M0 K2 Schott	10027207	1	ST
507	.... Coupler SS-QC6-D1-10M0 K3 Schott	10027211	1	ST
534	.... Fitting elbow SO 52621-8-A10	10027502	4	ST
	TUBES			
535	.... Metal hose 8/2000	10010176	2	ST
538	.... Metal hose 8/500	10010245	8	ST
	OTHER PARTS			
684	.... Manifold LW13x180	10027340	2	ST

Figure 134 - Water System

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7.3 Cleaning Procedure

Clean all chambers with IP alcohol. After you have cleaned the whole chamber (including the heating chuck) wipe all surfaces of the bonder with IP alcohol. After you have cleaned everything, heat the chamber up to 300°C and evacuate it overnight.

7.4 Vacuum Pump

Exchange the tip seal of the vacuum pump annually.

7.5 Vacuum Gauges

Remove the vacuum gauges and ship them to the manufacturer for cleaning and recalibration.

7.6 Heater Cooling

Check the flow rate for the top and bottom side heater. Compare the rates with the recommended ones.

7.7 Waterlines

Clean all waterlines chemically and mechanically. If there are visible deposits in the lines check your water quality and the water filter!

7.8 Turbo pump

It is strongly recommended to exchange the oil lubricant reservoir in the pump annually.

Further instructions how to precede please find in the Pfeiffer Operation Manual in the Technical Section of this manual.

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7.9 Wafer bow Contact of the Piston

Check if the wafer bow contacts the bond tool when you press wafer bow button in the bonder diagnostic. The adjustment has to be done by an authorized EVG service engineer.

A yearly maintenance done by an EVG Service Engineer is strongly recommended.

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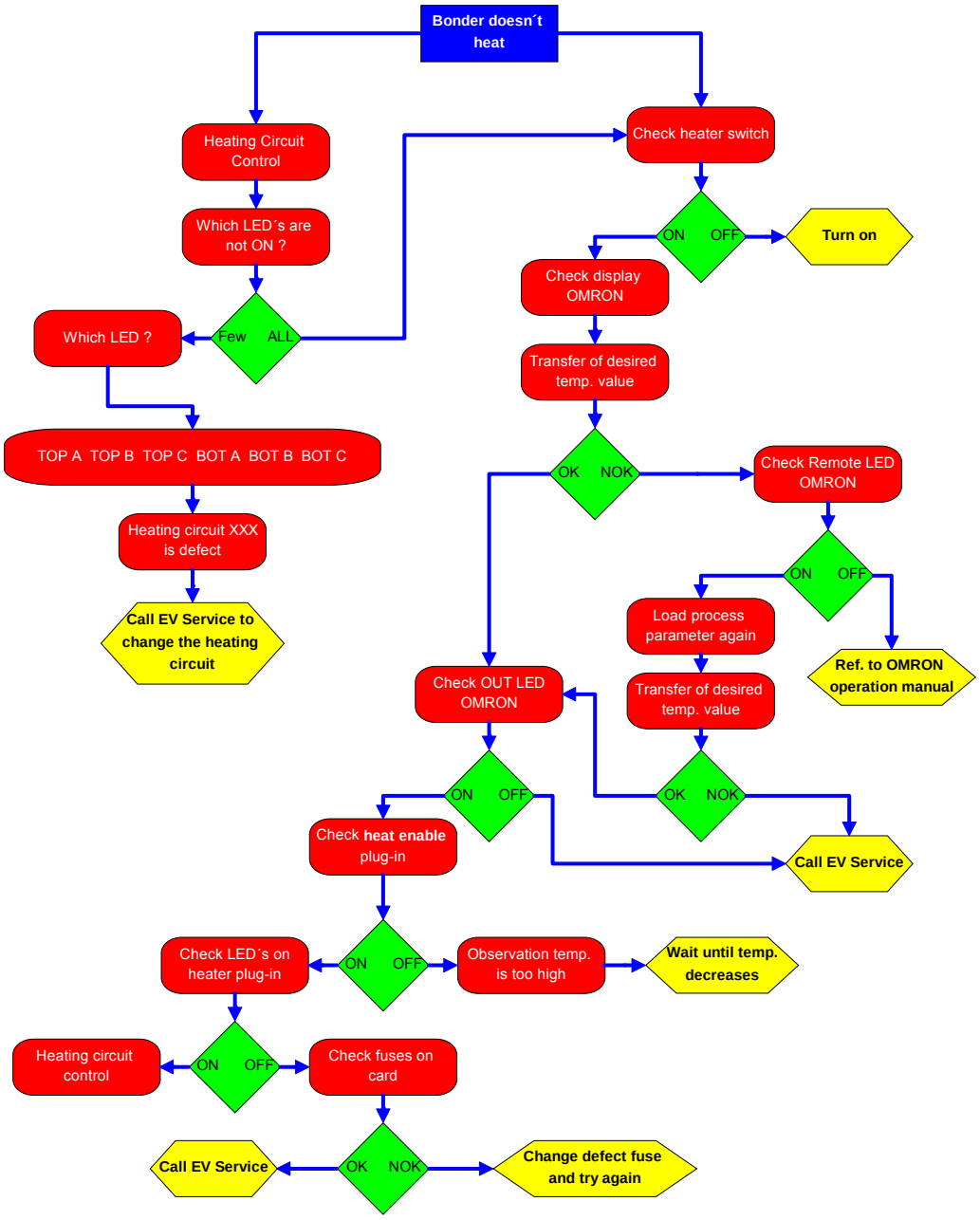
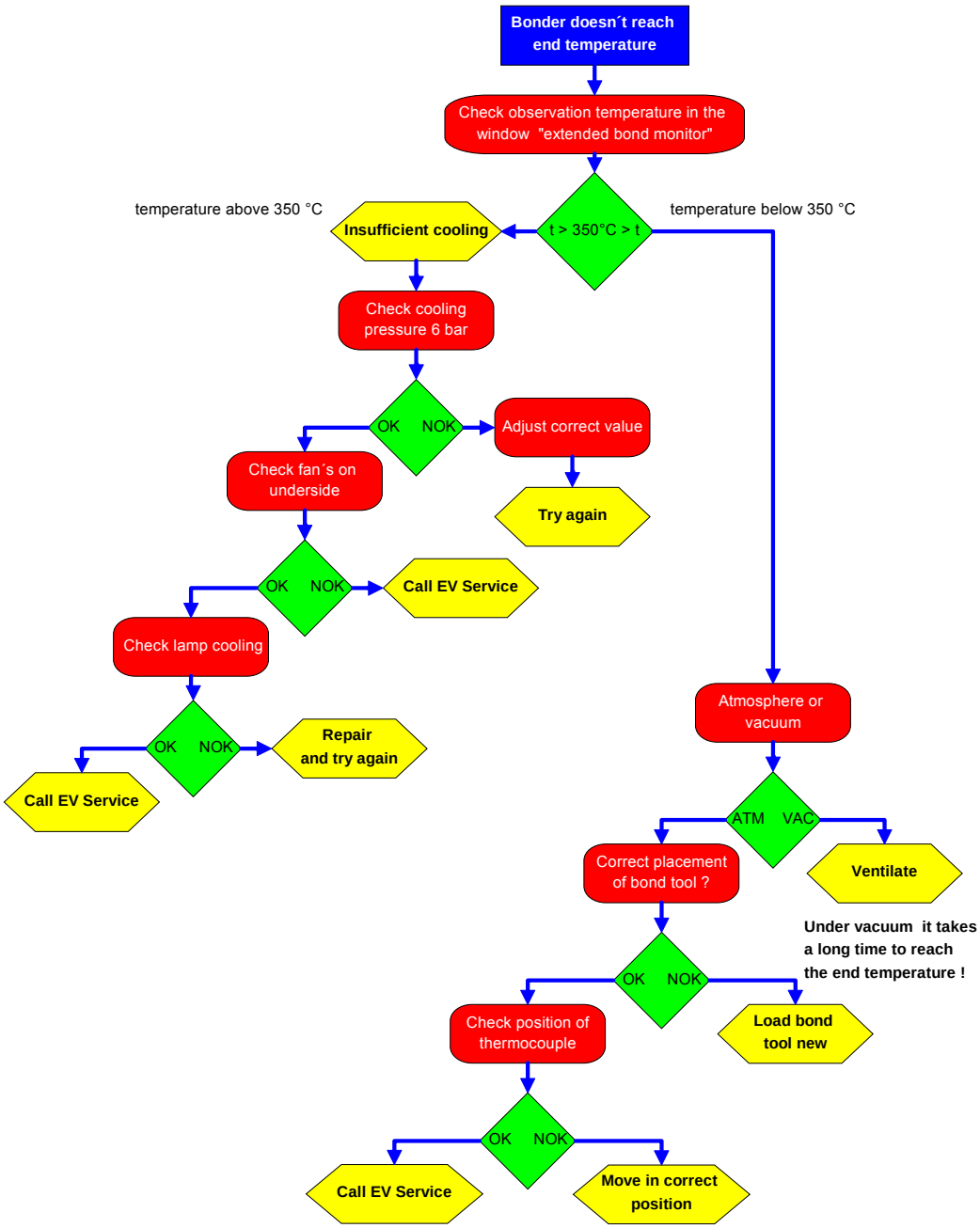
8 Troubleshooting

8.1 Bonder doesn’t heat

Bonder doesn’t heat



8.2 Bonder doesn’t reach end temperature



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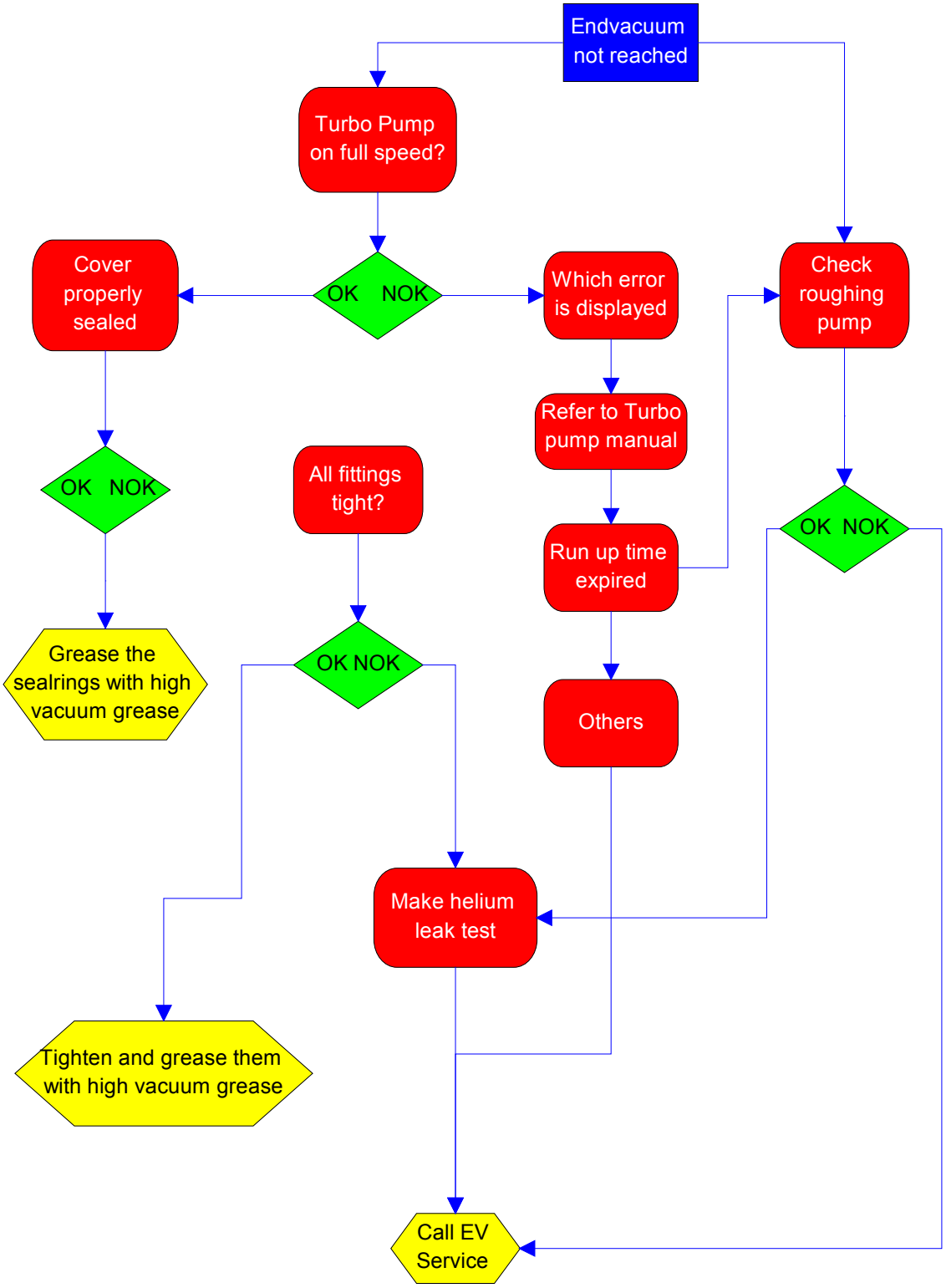
8.3 Endvacuum not reached



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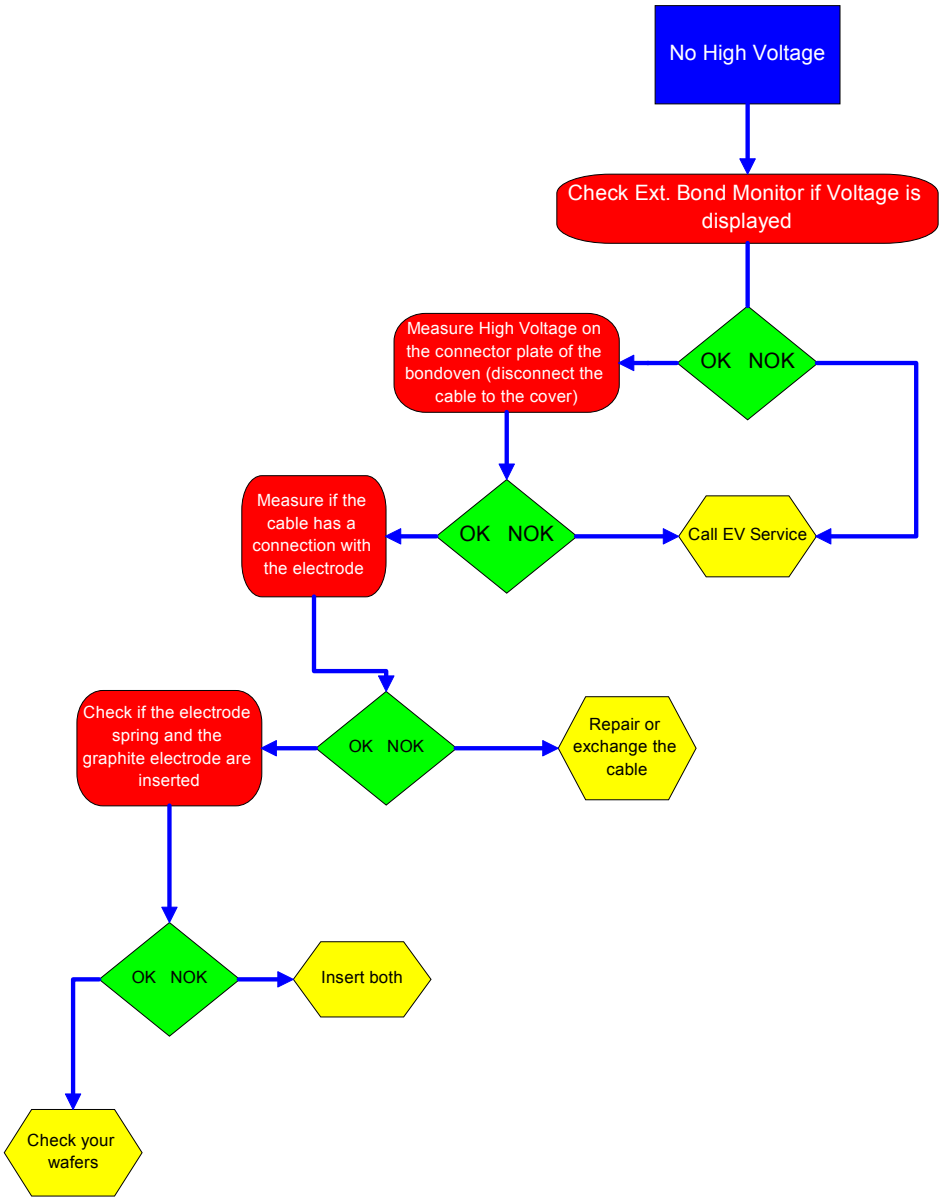
8.4 No High Voltage


No High Voltage
Check Ext. Bond Monitor if Voltage is displayed
OK NOK
Measure High Voltage on the connector plate of the bondoven (disconnect the cable to the cover)
OK NOK
Call EV Service
Measure if the cable has a connection with the electrode
OK NOK
Repair or exchange the cable
Check if the electrode spring and the graphite electrode are inserted
OK NOK
Insert both
Check your wafers

Attention High Voltage: Take care when you measure on the high voltage connectors. Measure only with specified tools and take care about the safety requirements.

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9 Personal Protective Equipment (PPE)

Chemical resistant latex gloves

This PPE is required when working with Isopropyl alcohol or NH4OH contaminated units (cleaning chambers, brushes, etc…).

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10 Lockout/Tagout

Mainswitch OFF and LOCK:

Start und shutdown procedure

Power OFF

The sequence for powering down the system is:

1) Follow the guidelines for shutting down Windows

2) At the screen “It is now OK to turn off your computer”, Turn the main switch counter clockwise 90* to the OFF position

Power ON

The sequence for powering up the system is:

1) Turn the “Main Switch” clockwise 90* to the ON position Switch on the computer which is located behind the left door. The main EVG5xx program should be located on the Windows desktop in a folder called EVG5xx, open this folder and double click on the EVG5xx icon

2) Turn on the heater power circuit breaker clockwise 90* to the ON position.

NOTE: Main switch has to be on when switching on the heater-power circ. Breaker.

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11 Facility Requirements

Purpose / Type		Volume / Specification
Voltage:		
European System:		230V, +/- 5 %, 50/60Hz 3-phase, 5wire
US System:		120V/208V, 5 wire system, +/-5%, 50/60 Hz (3-phase)
Japan System:		200V, 4 wire system, 3-phase
Nitrogen or compressed air (dried, cleaned):	OD: 8 mm (3/8")	6 bar (Minimum) – 8 bar (Maximum) 8bar (Minimum) – 10bar (Maximum) for 10kN and 60kN Bonders
Purge gas:	OD: 8mm (3/8")	10 bar (Maximum)

Cooling Water

EVGroup's cooling chucks are based on small precise channels machined in aluminum. Because of the small size of the cooling channels it is imperative that the cooling water be free of particulate contamination as well as any biological contaminates. The water must also be free on any chemicals that react with aluminum, to prevent damage to the aluminum. Adherence to the following specifications will ensure that there are no problems with the cooling chucks. Any consequences resulting from failing to adhere to the specifications will be the customer's responsibility.

Cooling Water Quality:

Closed loop system filtered (100 micron filters); the cooling water must be mechanically clean, optically clear, without deposits, to keep the cooling circuit free from dirt and organic suspended matter. To avoid corrosion damages, the following requirements for the cooling water must be met:

Requirements:

Recommended is the mixing of **inhibited Propylenglycol** 30 - 50 % Vol. in DI-Water (e.g.: Heat Transfer Fluid Dowcal 20 from DOW Chemical Company)

pH value: 7 – 8.2

max. oxygen content: < 4mg/kg (ppm) - due to level of Propylenglycol

If mixing with tap water the following requirements must be met:

max. chloride content of tap water: < 25mg/kg (ppm)

max. hardness of tap water: < 100mg/kg (ppm)

Aggressive carbon dioxide and ammonia should not be detectable!

Temperature: 16-18°C

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11.1 EVG520

Purpose / Type	Dia./ Size	Volume / Specification
	OD: 8 mm (3/8”)	8 bar (Minimum) – 10 bar (Maximum)
Nitrogen or compressed air (dried, cleaned): Flow rate:		30 Liter/min (63,5 ft³/h)
Cooling water:	ID: 13mm	Pressure: 3 - 5 bar (44 - 73 psi) Flow rate: > 9 Liter/min
Power requirements:		
Maximum power input:		9.1kW (150mm heater configuration) 13.9kW (200mm heater configuration)
Fuse rating:		European system: 35 Ampere (Fuse Type: slow) US/Japan system: 63 Ampere (Fuse Type: slow)
Heat load for EVG520:		150mm heater with active topside cooling → 6.5 kW 150mm heater without active topside cooling → 4.5 KW 200mm heater with active topside cooling → 8.5 KW 200mm heater without active topside cooling → 5.5 KW
Weight (machine):		665 kg

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History

Date	Modification	by
2008-12-12	Formatted	WAA
2009-03-06	Added “Adjust heater offset”	SEB
2011-07-11	Updated topics with EVG501 manual	WAA
2012-01-03	Reworked	HBA
2012-11-15	Updated topic “Water Flow”	HBA

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File:	EVG520_PM-Manual_PM_eng_10.doc			
Created on:	2012-01-03		Printed on:	2012-11-15
Version:	1.0		Last revision	2010-07-23
Purpose:	Maintenance		Language:	EN

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EaseUS Todo Backup

Customer Support Documentation
EVG

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1 General Information

1.1 Introduction

Recovering the system PC from a backup may be necessary if:

- The operating system is working properly but other essential files have been damaged or deleted permanently.
- Essential files of the operating system have been damaged or deleted permanently and the system PC does not boot successfully.
- The system PC hard drive is damaged and the system needs to be restored after installing a new hard drive in the system PC.

Note: EV Group is only able to restore the system PC to the state of delivery date. Therefore it is highly recommended to backup the system PC regularly!

Note: Please contact EV Group Technical Support if any problem occurs while using the backup software.

The following chapter describes how to start the backup software in EVG Explorer.

1.2 Start Backup Software

In EVG Explorer, open **Maintenance Tools** and double-click **EaseUS ToDo Backup** to start the backup software.

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The backup software will be opened where all features and settings for backup and recovery can be set up.

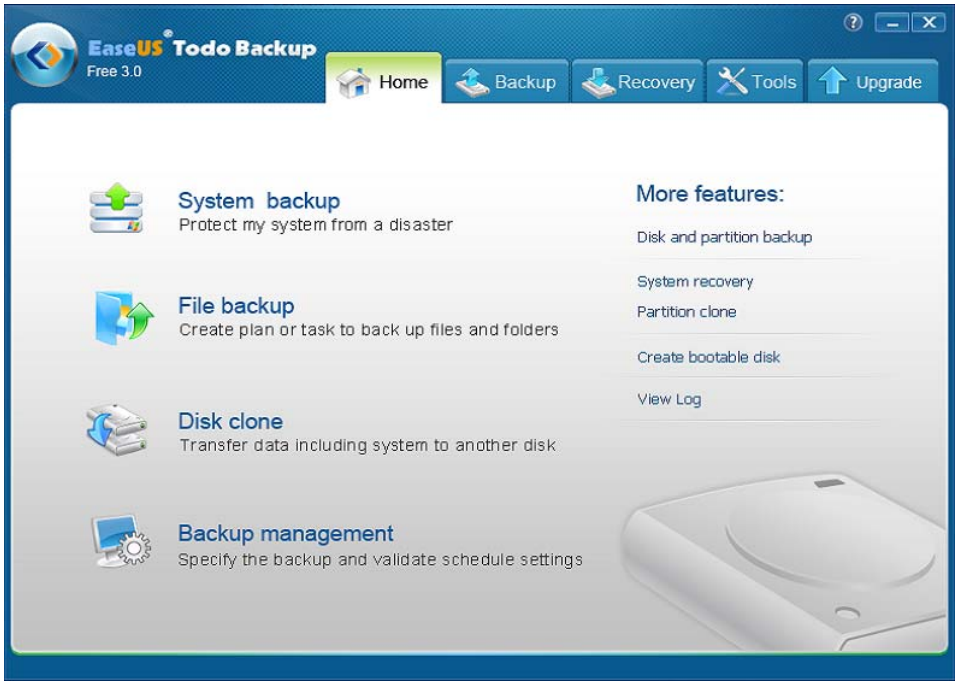

Figure 1 - Backup Home Screen

Note: Maintenance Tools is only available depending on permissions of the user currently logged into the system.

The following chapters describe how to backup, recover from a backup file and how to use the Pre-OS boot menu.

1.3 Pre-OS

Pre-OS can be considered as a simple OS environment which can be used without system login or a ready bootable disk created. It is especially useful when the operating system fails to boot, login Pre-OS environment and recovering from a previous image will resolve the trouble easily.

Refer to **3.3 Recover using Pre-OS** to find information on how to recover the system PC using the Pre-OS.

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2 Create Backup

Backup or the operation of backing up always means creating copies of important data, with these additional copies, you can get your data back to previous health status after suffering an unexpected computer disaster. So the main purpose of backup operation can be considered as that to recover data as a reaction to system failure or data loss.

Note: In order to ensure a rapid and successful backup process, please try to close other applications as possible as you can before starting the operation, and never try to save the image file to the partition/disk which you are intending to image.

There are three different approaches to backing up and recovering the system PC:

- Backup and Recover to/from a file on the backup hard drive
- Backup and Recover to/from an bootable media (DVD or USB stick)
- Backup and Recover using the Pre-OS boot menu

2.1 Maintenance / Recommendations

It is highly recommended to:

- **Create a bootable media (DVD or USB stick)!**
- **Create a backup file and store it to an external drive (e.g. network drive) rather than to the local hard drive!**
- **Create a backup at least once every month!**

The following chapters describe how to create a backup of the system PC.

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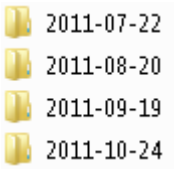
2.2 Creating a System Backup File

Before creating a backup, make sure that there is a folder named with the current date in the format “YYYY-MM-DD” (“year-month-day”).

This will ensure that different backup files can be easily found in the folder structure.

Example:



Select **System backup** from the **Home** or **Backup** page.

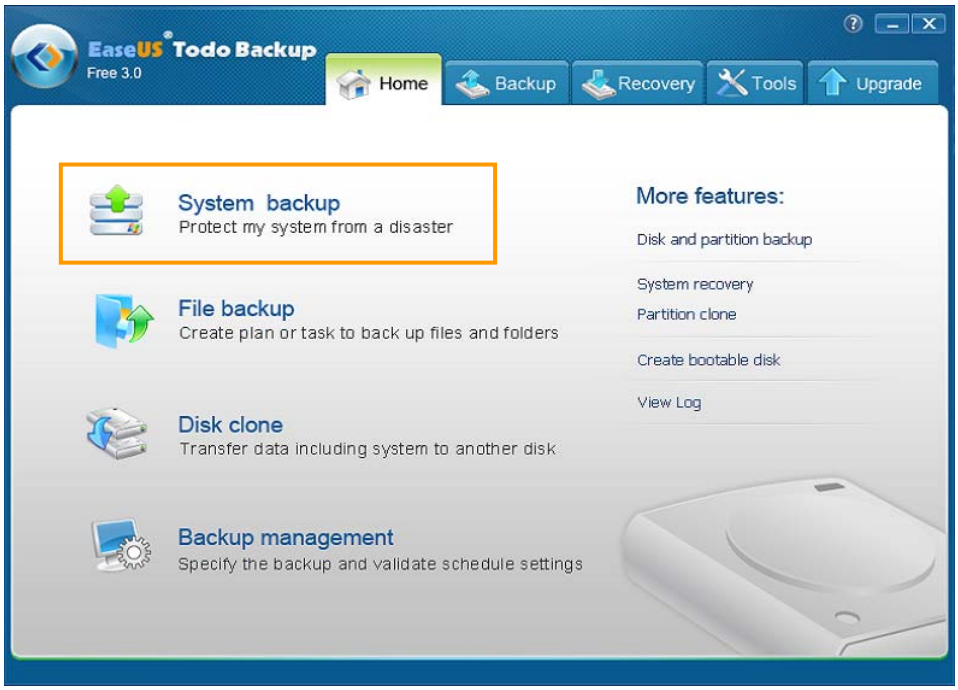


Figure 2 - System Backup

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Select the destination folder (e.g. on a backup hard drive or network drive) and click **Proceed** to continue.

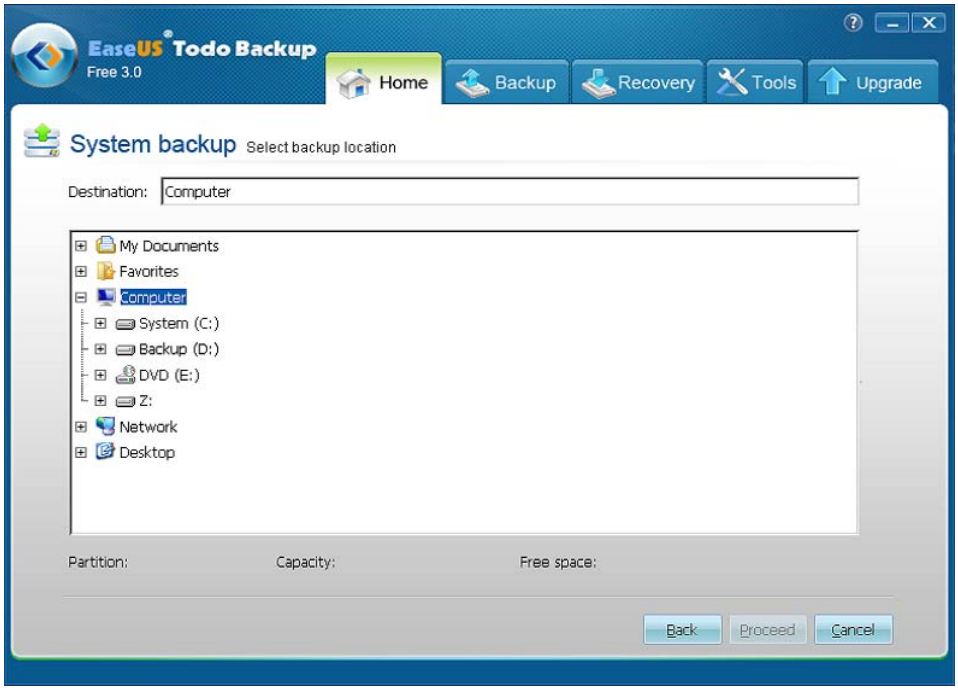

Figure 3 - Select backup location

Note: It is recommended to store the backup file on a network drive!

Wait until the system backup process is finished and click **Finish**.

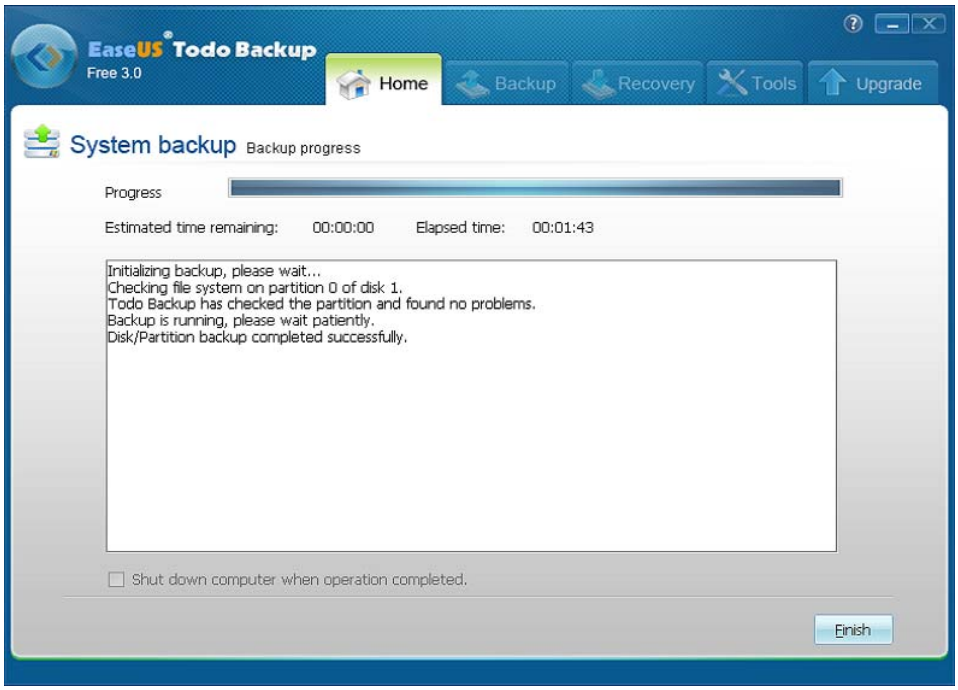

Figure 4 - Backup progress

2.3 Create a Bootable Media

Go to **Tools** and click **Bootable media builder**.

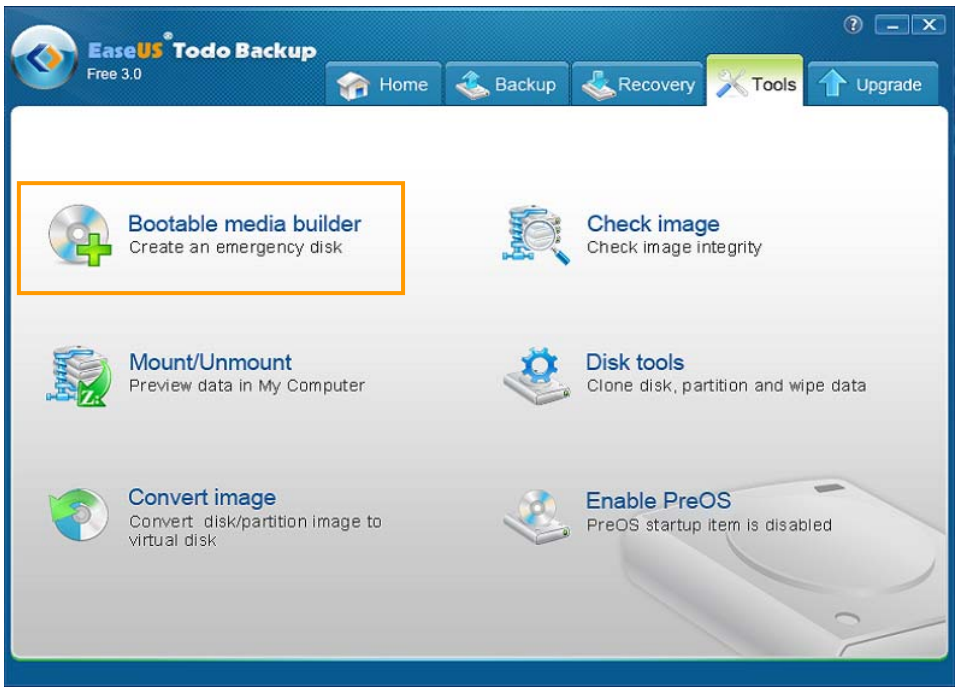

Figure 5 - Tools page

Select if the bootable media should be stored on a **DVD** or **USB stick** and click **Proceed** to continue.

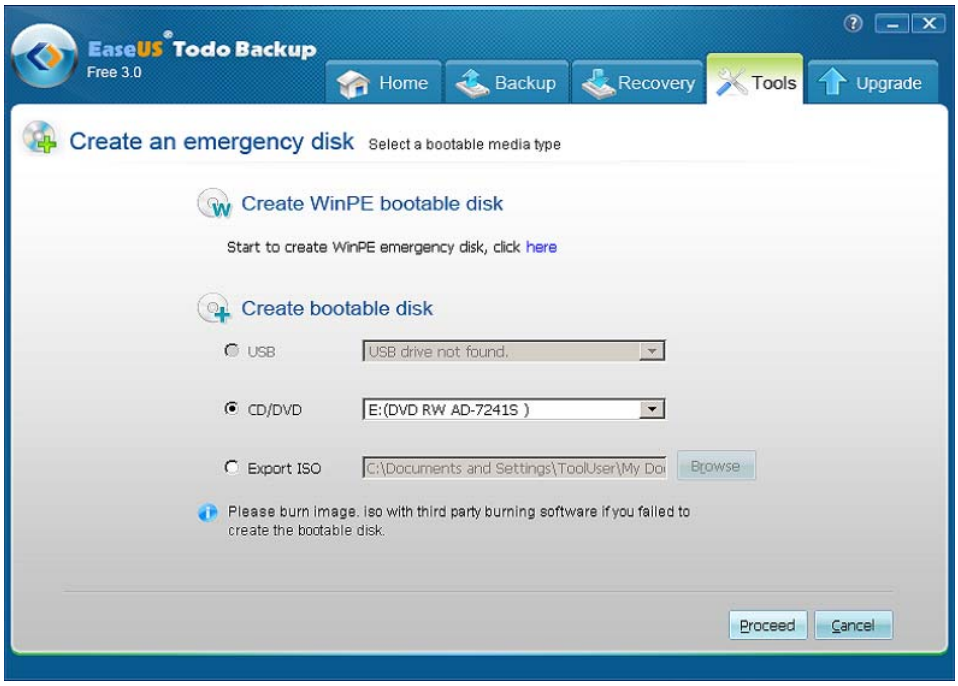

Figure 6 - Select bootable media type

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Wait while the bootable media is created and then click **Finish**.

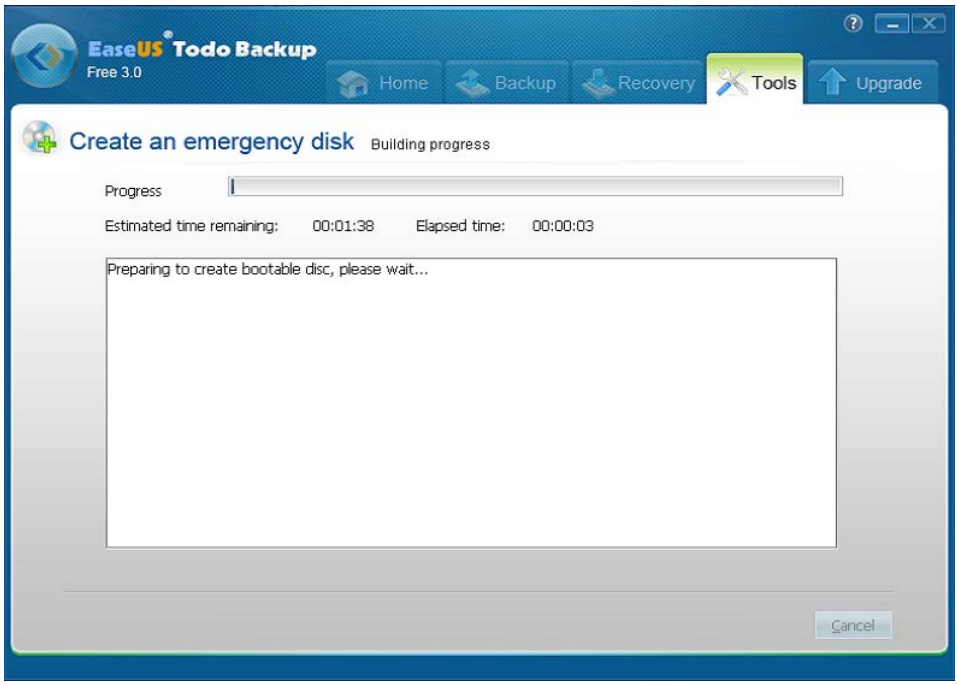
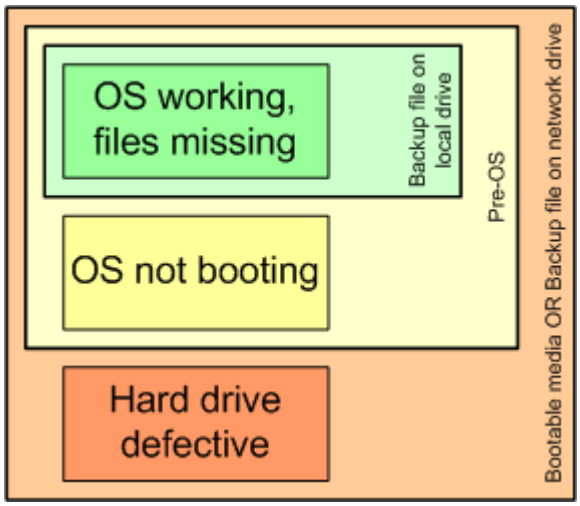


Figure 7 - Building progress

3 How to Recover

Depending on the issue, recovery can be performed according to the following figure (e.g. bootable media or backup file on network drive can be used in any case):


OS working, files missing
Backup file on local drive
Pre-OS
OS not booting
Hard drive defective
Bootable media OR Backup file on network drive

OS working properly, PC booting successfully, but other files are damaged or missing	• Recover using backup file on local hard drive • Recover using backup file on network drive • Recover using Pre-OS • Recover using Bootable media (DVD or USB stick)
Booting system not possible (essential files of OS damaged or missing)	• Recover using backup file on network drive • Recover using Pre-OS • Recover using Bootable media (DVD or USB stick)
Hard drive damaged (new hard drive has been installed)	• Recover using backup file on network drive • Recover using Bootable media (DVD or USB stick)

Note: Please contact EV Group Technical Support if the hard drive is defective!

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3.1 Recover from Backup File

Go to **Recovery** page and click **System recovery**.

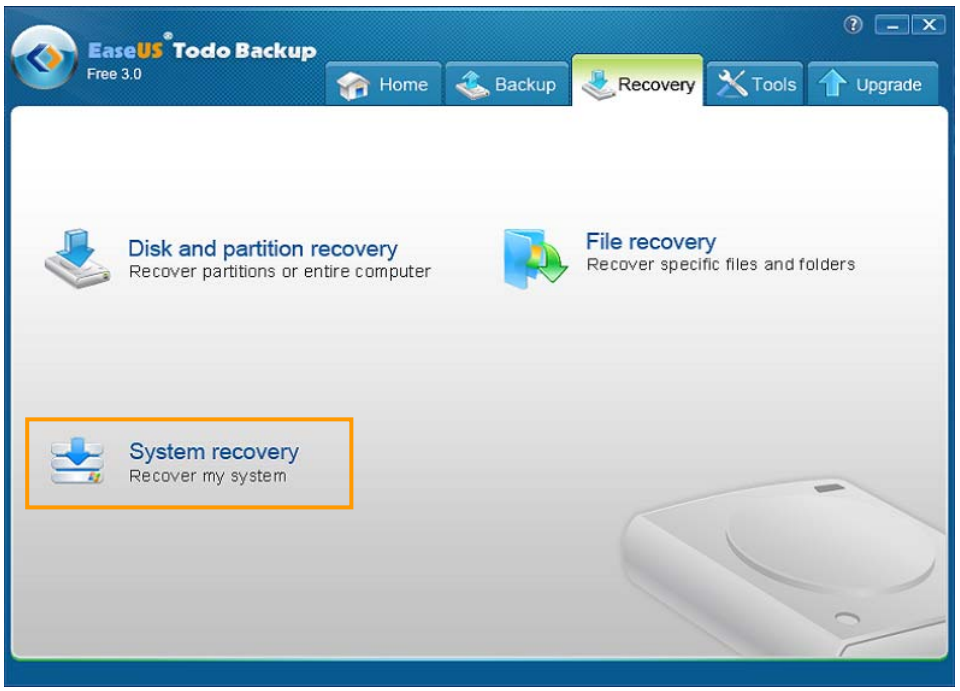

Figure 8 - System recovery

Select the recovery file location from the file browser (on local hard drive or network drive).

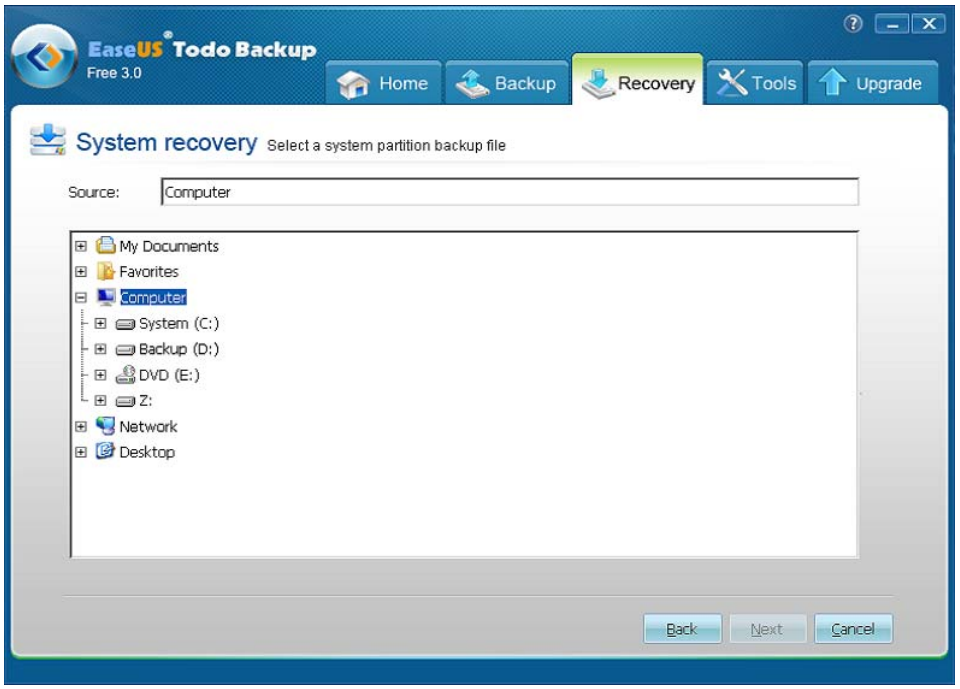

Figure 9 - Select recovery file

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Select which hard drive should be used as a recovery location.

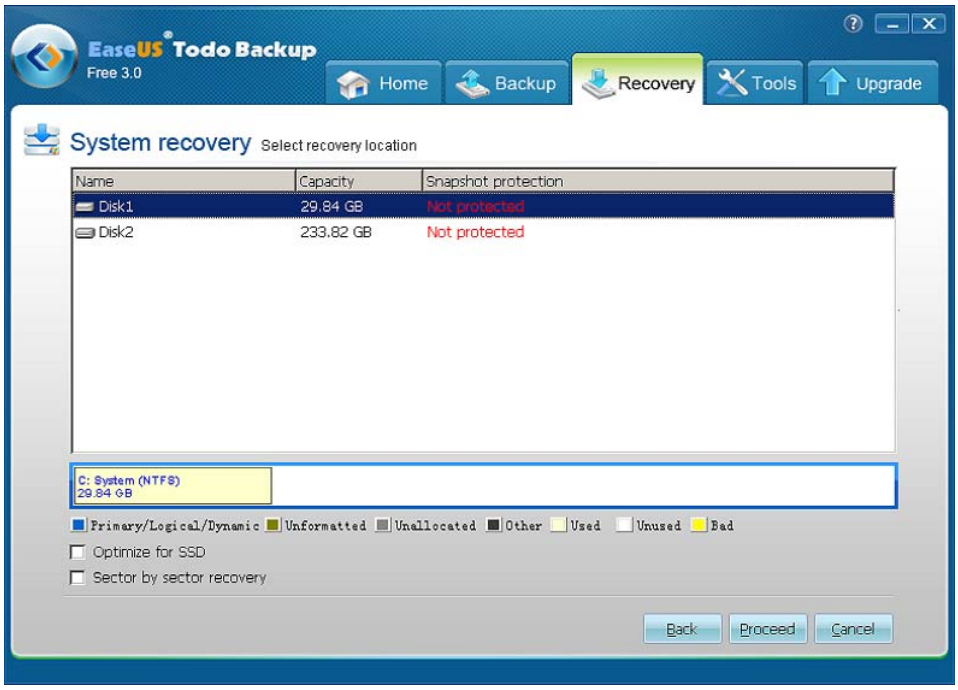

Figure 10 - Select recovery location

Note: When you intend to recover under Pre-OS or bootable CD/USB environment, please make sure the entire path which contains the image file consists of ASCII characters only.

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3.2 Recover with Bootable Media

Turn OFF the system PC.

Insert the bootable emergency DVD into the DVD drive of the system PC or plug the portable USB stick into a free USB port of the system PC.

Turn ON the system PC.

Wait for the boot menu to appear and select **EaseUS Todo Backup** to continue.

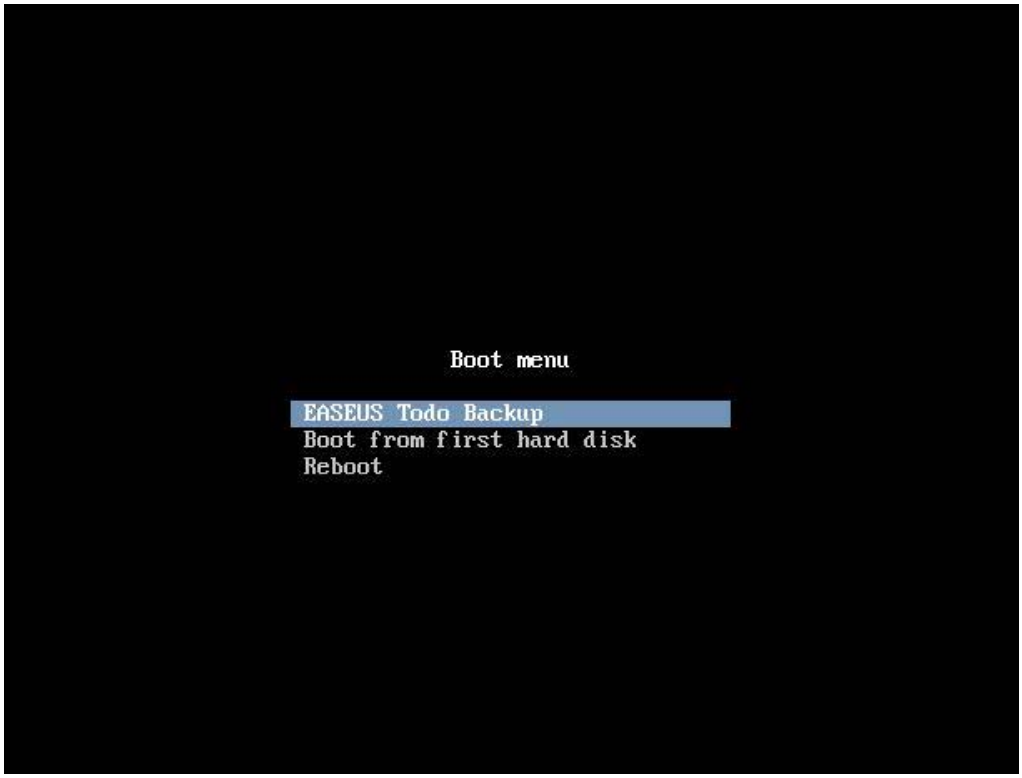

Figure 11 - Boot menu from bootable media

Follow the instructions on the screen to recover the system PC.

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3.3 Recover using Pre-OS

After switching on the system, the following boot menu will be displayed.

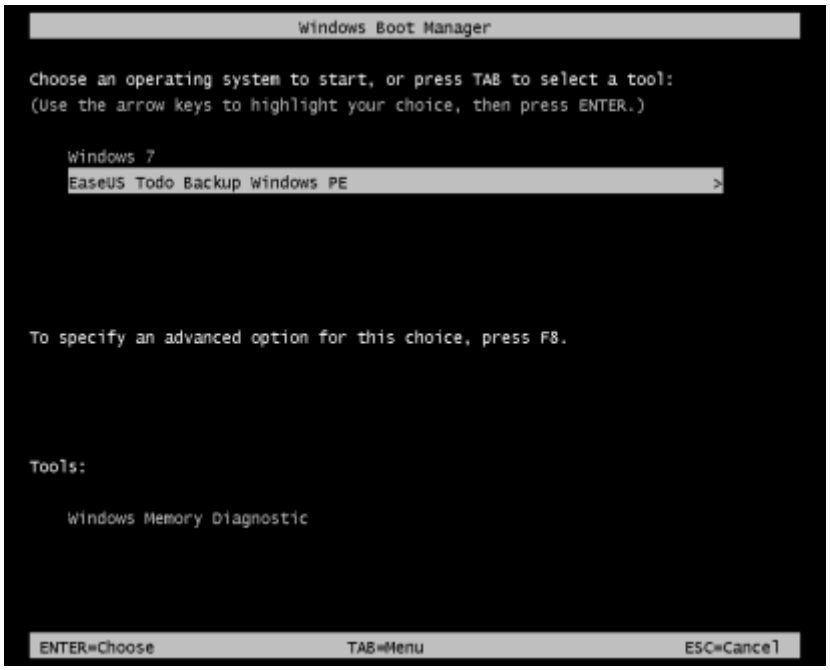
Windows Boot Manager
Choose an operating system to start, or press TAB to select a tool:
(Use the arrow keys to highlight your choice, then press ENTER.)
Windows 7
EaseUS Todo Backup Windows PE
To specify an advanced option for this choice, press F8.
Tools:
Windows Memory Diagnostic
ENTER=Choose
TAB=Menu
ESC=Cancel

Figure 12 - Boot menu for Pre-OS

Choose **EaseUS Todo Backup** to start the Pre-OS backup tool or choose **Windows** to start the operating system on the system PC.

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The software looks like in Windows except that some functions are disabled in Pre-OS.

Go to **Recovery** and click **System recovery**.

Follow the instructions in chapter **3.1 Recover from Backup File** to recover the system PC in Pre-OS.

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History

Date	Modification	by
2011-10-24	First written with LES and KT	WAA

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